

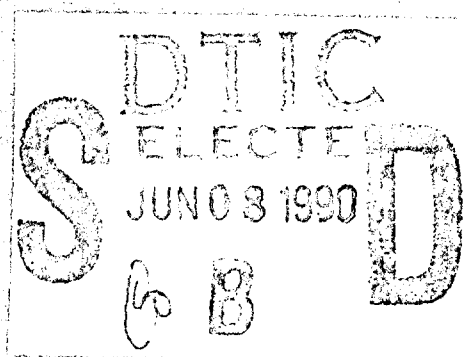
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The U.S. Air Force Budget and Posture over Time

Kevin N. Lewis



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Based on large-scale trends regarding Air Force planning over the 25 years from fiscal years 1962 to 1986, this report compares inputs--in the form of defense resources--with posture outputs--such as alert strategic warheads, tactical fighter squadrons, airlift ton-mile potential, etc. After examining important trends in Department of Defense and Air Force budgets, the author provides an overview of the historical Air Force posture and budget. He then presents close-ups of strategic, general purpose, and deployment capabilities. The research suggests that over time, the enterprises that comprise the total U.S. defense effort have substantially converged, driven mainly by fiscal reality.

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The U.S. Air Force Budget and Posture over Time

Kevin N. Lewis

February 1990

A Project AIR FORCE report
prepared for the
United States Air Force

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PREFACE

The problem of reconciling the changing requirements of our national security strategies with resource constraints has vexed U.S. political and military planners since the end of World War II. Planners and policymakers readily acknowledge that the budgets needed to maintain all of the military capabilities called for by any conservative "needs-based" estimate of U.S. posture capabilities (such as those prepared by the Joint Chiefs of Staff) are unlikely to be available short of national mobilization in the face of a grave emergency. Accordingly, resource allocation within the total national security planning process can be reasonably thought of as a process of deciding *where* shortages can be best tolerated in our defense postures and preparations and what the consequences may be of a gap between desirable and realistic force goals.

To better comprehend the issues at stake in the complicated process of budget and posture policymaking, RAND's Project AIR FORCE sponsored a study entitled Major Air Force Issues, the main goal of which has been the analysis of certain "strategy vs. force imbalances" and the distillation of meaningful historical lessons for planning choices in the future. These assessments should be of interest to planners involved with strategic deliberations as well as to those concerned with more day-to-day planning tasks. This work was conducted under the auspices of the National Security Strategies Program.



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SUMMARY

The evolution of large-scale historical trends may provide useful insights into future USAF force and resource planning issues. It is, of course, imprudent to rely too heavily on simple extrapolations, but certain particularly relevant indicators should be carefully monitored as the USAF considers options for the future. Not every variable will be under the control of planners; and where there is room to maneuver, many choices would involve difficult tradeoffs where criteria for choice and techniques for implementation of policy may be very complex. Nonetheless, based on what has transpired over the past quarter century, certain general patterns emerge. Deviations from these can be used as reference points for policymakers contemplating future choices.

This report relies on large-scale trends regarding Air Force planning over the 25 years from fiscal years 1962 to 1986. In general, input in the form of budgetary data is compared with output in the form of force posture components (alert strategic warheads, tactical fighter squadrons, airlift ton-mile potential, etc.).

Thus far we have counterbalanced increasing costs and fixed budgets by cumulating marginal increases in efficiency and effectiveness. Success and persistence in this policy will continue to be essential in the future.

Between 1962 and 1986, the overall defense budget has grown at an average real rate of about 2 percent per year. Obviously, however, this average incorporates substantial peaks and troughs.

Since FY48, the USAF has had the highest annual average budget of any service. The USAF's share of the defense budget declined slightly until FY70, when it began to fall at a more substantial average rate. After FY80, however, the USAF budget increased by 9.3 percent per year.

USAF budgets have tended to increase or decrease at the same rate as the overall defense budget with three exceptions.

Overall Posture and Inventory Trends

- The USAF force posture declined from almost 600 squadrons in FY62 down to about 400 total squadrons by FY86. Much of the reduction took place in the strategic area (bombers and continental air defense units). Tactical aircraft inventories have increased slightly in size since the abandonment of the massive retaliation doctrine.

- After the mid-1950s, a fairly dramatic decline in aircraft acquisition rates occurred. In essence, the USAF purchased more aircraft in the five year time block from FY52-56 than it has from FY57 to the present day.
- Procurement during the FY62-86 period has not been sufficient to meet stated force replacement objectives, and the overall USAF force has been aging steadily over time.
- In constant dollars, the average cost per flying hour stayed in the \$3,000/hour area until the early 1970s, when the rate increased steadily upward.
- In combination, these trends must be considered as a warning for those who would like to maintain the USAF at something like its present size. Barring unusually large increases in its budget, it appears that the USAF may have to accept some combination of an older force and a smaller force.
- Within the USAF budget as a whole, procurement, and especially procurement of aircraft, seems to be the account most affected by movement in budgets.

Strategic Forces

- The cost per deliverable warhead in the U.S. has in general declined since FY62.
- Strategic air defense forces have declined greatly since FY62 as a result of policy decisions made in the McNamara era and sustained subsequently.

General Purpose Forces

- The tactical force increased in size from 90 squadron equivalents in FY62 to about 115 squadron equivalents in FY86. In addition, the relative contribution made by the Guard and Reserve has increased.
- In only two periods since FY62 has the USAF purchased sufficient fighters to maintain its existing posture given stated average aircraft age goals.
- Fighter squadron operating costs increased dramatically during the Vietnam war and then declined during the 1970s until toward the end of this decade, when costs began to increase steadily again.

Deployability Forces

- Beginning in the 1960s, with the acquisition of the C-141 and then the C-5, USAF deployment capabilities increased dramatically.
- Overall fleet strategic airlift capacity has doubled when comparing the early 1960s to that of the present day.
- The Civil Reserve Air Fleet plays a key role in augmenting USAF airlift capabilities. CRAF cargo capabilities, however, have declined significantly in recent years.

Planning and Policy Choices

The cost of acquiring and maintaining major posture components has tended to grow in real terms over time. The reasons for this vary depending on the specifics of the case in question, and the rates at which upward cost growth occur vary greatly too. Regardless of the details, however, the lesson for planners today seems clear: should budgets hold steady or decline, we will have to explore vigorously some possibly painful tradeoffs including force structure size reductions, less readiness, tolerating retention of older platforms, abandonment of selected missions, and so on. Conversely, if we add new missions, or if the costs of fixed activities grows over time significantly in real terms, the squeeze on other endeavors will be that much greater. Obviously, continued decline in the DoD top-line and the USAF budget itself will be a problem, no matter what.¹

Of course, the defense and USAF budgets do not go upward in every year, nor do periodic surge-spending years produce the kind of money that would be needed to undo all of the effects of any particular period of extended budget decline.² The consequences of this fact of life are inevitable, and the result often involves posture shrinkage. **Thus, one basic problem before planners—now and for the foreseeable future—is: given estimated requirements for some level of posture or another, how do we maintain the necessary capabilities given such ominous facts of life? If buying and maintaining posture grows in cost, and if budgets do not keep pace, then we must select from among these three force management options.**

¹Since FY85 and through FY89, the DoD budget (in Budget Authority) has declined by 10.9 percent in real terms; that of the USAF budget by 15.4 percent.

²The "extra" funding produced in budget surges typically pays for immediate real-world requirements as well as selected new options. Relatively little of this funding can be considered "get well" money.

- **We can redefine our basic criteria and objectives so that we do not violate basic strategic requirements.**
- **We can seek major changes in the way we buy and maintain forces.**
- **We can struggle from year to year to eke out that few percent of savings and increased efficiency to fight the inexorable upward movement in costs.**

The first option involves basic strategic priorities and options—for instance, diminished emphasis on day-to-day preparedness, or an unwillingness to prepare to fight sustained conventional wars for very long. Though some may have such ideas, such questions really are not part of our agenda here. The second approach is, to be sure, the most popular and the most frequently encountered proposal in defense debate. However, advocates of major, overarching reform often overlook two points: the ability of attempts at organizational change in themselves to influence underlying processes that exist for good reasons, and the ability of major reform to buck powerful trends on a continuing and systematic basis. Moreover, reformers may be overestimating the amount of “savings” which reform could bring, even if new techniques were to be implemented ideally.

Given the realities of the day-to-day defense management process, the third approach to budget control—working on the margin to produce a few extra percent points of efficiency and effectiveness—is where the payoffs really may be. These few percent points of gain can be spent in two ways: (1) they can be used to mitigate upward cost-of-posture creep; (2) they can be used to cushion the total USAF program against gradual top-line budget erosion. Under the circumstances, the essential questions for planners in the future would be:

- What major factors promise to cause major departures from the trends and developments discussed?
- Just how far can marginal improvements actually be taken at a realistic level of effort?

Analysis of the historical record shows that, by both major and relatively minor methods, the USAF has responded to pressures on its posture to maintain capabilities. It follows that such techniques should be borne in mind in future decisions, to the extent possible, though we must remember that many times modifications are opportunistic (and sometimes are second best options demanded when resources fall below planned levels) and therefore are hard to anticipate in a formal planning framework. But careful study may reveal certain traits of previous incremental modernization “success stories.”

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GLOSSARY

ADCOM	Aerospace Defense Command
AFRES	Air Force Reserve
ALBM	Air-Launched Ballistic Missile
ALCM	Air-Launched Cruise Missile
ANG	Air National Guard
ARF	Air Reserve Forces (the Guard and Reserve)
ATB	Advanced Technology Bomber (now the B-2)
CAS	Close Air Support
CRAF	Civil Reserve Air Fleet
FBM	Fleet Ballistic Missile
FYDP	Five Year Defense Plan
GPF	General Purpose Forces
G&R	Guard and Reserve
IOC	Initial Operational Capability
MBT	Main Battle Tank
MFP	Major Force Program
MilPers	Military Personnel
MTMD	Million Ton Miles per Day (of airlift)
O&M	Operations and Maintenance
PAA	Primary Aircraft Authorization
SBS	Strategic Bomb Squadron
SCN	Shipbuilding and Conversion, Navy
SDF	Strategic Defense Forces
SNDV	Strategic Nuclear Delivery Vehicle
TAF	Tactical Air Forces
TFS	Tactical Fighter Squadron
TFW	Tactical Fighter Wing
TOA	Total Obligational Authority

I. INTRODUCTION

From its declaration of independence from Britain, the United States has spent something like \$12 trillion (in \$FY86) to meet a broad array of national security responsibilities by direct means.¹ Despite the long period over which these funds were spent and the great diversity of our military enterprises over that time, more than half of this total amount has been spent since the cessation of hostilities in Korea in 1953. Should the dominant phenomena of the past quarter century persist (with defense spending now running at a rate of between \$8,000–\$10,000 per second), a budget analyst born today would probably witness a doubling of the \$12 trillion figure before he retires.

From 1953 to the present, the United States has annually committed an average of about 7.6 percent of its GNP toward the national defense; since FY62, the average has been about 6.7 percent.² National defense, while a large financial responsibility, consumes less of our national wealth than debt service, education, health, or entitlements generally. But it is misguided to interpret these numbers simply in terms of their relative or absolute implications for the economy. Defense is not just a matter of heavy expenditure: The nation's existence depends on the wisdom of our defense spending decisions as well as the adequacy of the resources made available to underwrite those decisions.

Between its establishment in 1947 as an independent service and FY86, the USAF accounted, on average, for 35 percent of the total DoD budget—about \$2.9 trillion. Anyone interested in various fiscal, monetary, and private sector issues might well ask several questions:

1. What has determined the size and internal breakdown of such formidable numbers, and what now determines them; how might the determinants of the defense budget and the posture it buys evolve in the future; and with what confidence and caveats can predictions about future budget trends (and hence possible policy options) be made?

¹Clearly, drawing precise parallels over a long history is risky. The radically different defense environments over time confront us with a great index number problem: Put simply, the Minuteman of Bunker Hill and the Minuteman of Grand Forks are entirely different breeds of cat. Thus, the historical figures cited here should be considered notional only. "Direct means" refers here to military forces, rather than ancillary security capabilities such as immigration controls, the Coast Guard, strategic petroleum reserves, and other stockpiles—Selective Service, Civil Defense, etc.

²Measured in terms of outlays.

2. In large-scale terms, what posture have budgets supported in recent years, and how has it been maintained? What, especially, have been the assumptions underlying the allocation of resources among competing defense budget enterprises? Of greatest importance, how is it possible to estimate whether we have, from time to time, invested too much or too little toward some national security end?
3. From a USAF perspective, what commonalities and areas of incongruence exist compared with DoD spending patterns at large? What have been the costs of maintaining similar USAF posture building blocks over the years? Are there recognizable trends within budgets and postures and their internal relationships—toward greater efficiency, toward an ever-higher real cost to accomplish a “fixed” mission, or whatever—that stand out as meaningful success stories or warnings?
4. If the past holds any clues regarding the future, what may be among the more important USAF posture and budget issues of the coming decades? What factors may influence the patterns such a budgetary future takes and how can this future be positively influenced?

These are not new questions. Uncounted words have been written to describe the history of the processes that have motivated, inhibited, and otherwise influenced our defense allocations over time. Much sophisticated analysis has been directed toward the study of the many issues and vicissitudes associated with the maintenance of an effective and efficient defense establishment. Similarly, a vast effort has been devoted to the better analysis and management of national security problems; indeed, it has often been the need to generate solutions to extraordinarily difficult military matters that has led to the development of analytic techniques that can be applied to other policy problems.

But as any experienced planner also knows, no amount of analysis or research could ever resolve deep-seated differences of opinion about many critical matters. Nor are any techniques likely to be devised to reconcile the manifold components of what might be considered the “answers” to any of the foregoing questions in a reasonable fashion. Such theories would, of course, depend on fundamental intangibles; and much about national security planning remains unclear, contradictory, or unverifiable. Many decisions to adopt one rather than another policy option ultimately depend on general agreement or less-than-scientific “proof”; these include assumptions about the nature of contingencies for use in planning, determinations of “acceptable” levels of

risk, or perceptions that marginal returns on a given investment have fallen below a proper threshold. Moreover, we cannot ignore the effects that political forces inject into "rational" planning. Most important of all we make many of our decisions in a competitive, international setting, and our ability to make the behavior of others conform with our own plans and desires is very limited. It is no wonder that describing and explaining what has happened in the past is so difficult (not to mention the pitfalls of accurate prediction).

The assumptions that may shape the design and selection of policies, strategies, force structures, etc. over the next few decades, or even the next few years, can be only partially characterized today. In defense planning, even the most prudent policies do not guarantee success. The funding committed may be inadequate to head off future challenges or disasters, bad luck may intervene, and even "fully adequate" preparations may not deter those who, for whatever reason, seek to further their own goals in hostile fashion.

Yet there is much that can be said about the future national security context, including the budgets that will underwrite our policies in the future. Some things about the future are quite well determined. For instance, we are reasonably confident that we will bear a certain burden for, say, retired pay, in future fiscal years. We can estimate what the effects of an inevitable "baby bust" of the next decade could mean for military manpower management.

We are now embarked on many programs and plans that may have substantial budgetary implications for years to come. Although in theory things can be made to happen quickly, force structure tends to change slowly over time. One example can be found in two improved *Nimitz* class supercarriers now being deployed. These ships, initially designed in the late 1960s, were ordered in the FY83 budget, and can be expected to remain active components of the U.S. force structure into the fourth decade of the twenty-first century.

Although in principle we retain much freedom of choice, much can be practicably asserted about the future national security environment on the basis of a current snapshot of our situation. An excellent source of information for any forecast of the near and mid-term defense setting can be found in historical trends and developments.

The basic proposition of this research is that the past is very much prologue. In fact, this research strongly suggests that over time the enterprises that comprise the total U.S. defense effort have substantially converged, driven mainly by financial reality. This statement may seem counterintuitive given the occasionally profound "weather changes" in defense planning that seem to occur every so often (the

1983 introduction of an ambitious Strategic Defense Initiative being a classic recent case in point).

If history provides an acceptable and appropriate basis for projections of future posture developments, such precedents can be of great value in resolving current quandaries about major national security choices involving budgets and posture matters. Review of historical trends in the U.S. defense and USAF defense budgets suggests the kinds of constraints and options we might confront in the future. Provided there is some analogy in the scale of the resources invested, retrospective comparison of whether we have performed as efficiently or effectively as we might have under historically like circumstances is of more than academic interest. Corresponding questions to be reviewed include:

- Under the circumstances, have we been efficient with our spending within functional categories?
- Have we at the least maintained a posture that is effective according to certain high level criteria of deterrence?
- What posture have we chosen to maintain with available resources over the years, and with what mix of internal budget components?

THE METHOD IN BRIEF

In the following historical budget analysis certain essential aspects of the past defense effort are described in terms of rather simple inputs and outputs. The primary input is budget data. The "outputs" will be seen as a connected series of quite large-scale force posture end-strength measures, such as tactical combat wings, nuclear warheads on alert, or ton-miles of strategic airlift.

Other metrics are certainly possible as well as useful, because such "macro" posture measures seldom tell us everything an experienced planner would like to know about the specific military problem at hand. But such refined indices are not essential in the present exercise. The crucial assumption is that the basic premises on which Air Force planning is based are essentially correct. Even without repudiating USAF doctrine, however, other kinds of inputs and outputs obviously could be used. For instance, another input that might be used is "strategy": Critics gripe that even a doubling of U.S. military spending would go for naught if spent according to an incorrect or meaningless national plan. In a parallel fashion, some would criticize particular output measures used here. Many criticisms have some validity, but I have followed the present course because the technique is simple and lends itself to quantitative portrayal.

I assume a direct interaction that leads to the conversion of inputs to outputs somewhat consistently. Many commentators might dispute the role played by any postulated defense planning processes, preferring to attribute the behavior of those charged with the inputs and the outputs—and what happens in between—to a range of influences and phenomena that may not involve national security considerations at all. There is considerable validity in this criticism, but the aim here is to give a simple overview and history of the U.S. defense budget, with particular emphasis placed on those aspects of greatest interest to the USAF.

SOME PREFATORY REMARKS AND CAVEATS

The purpose of this document and its companions is to focus on large scale *trend* evolution. That being the case, we do not review in any detail important discrete developments one finds during the period FY1962–86 (such as the Vietnam War, the Reagan defense buildup, or the switch to the all-volunteer force).

This report concentrates on the period FY1962–FY1986. Occasionally data are given for the pre-FY62 period. I have elected generally to omit pre-FY62 discussion for two reasons. First, the major national strategy policies embarked upon by the Kennedy administration remain similar to the ones being pursued today. But the Kennedy era policies differ from those of the 1950s to a very considerable degree. Of greatest note is the rejection of the so-called Massive Retaliation strategy of the Eisenhower administration in favor of a “flexible response” doctrine, not just in nuclear employment, but among all possible U.S. military means.

The second reason for concentrating on this period concerns the management reforms implemented mainly by Secretary of Defense Robert McNamara. Not only did these new ways of doing business strongly influence the nature of the business being done, but the adoption of the Planning, Programming, and Budgeting System (PPBS) and the publication of the greatly emphasized annual “Posture Statement” provide a wealth of data that are very hard to collect for budgets and programs before FY62.

This research is based solely on publicly available, unclassified sources. It is true that more detailed or revealing trends could sometimes be demonstrated with classified data, but the levels of aggregation in this study make such extra refinements (as interesting as they may be) less helpful. Given the very large scale nature of the major constituent components of the defense enterprise as a whole, there are often discrepancies within even “official” sources on the same data point. In many cases,

these are the consequence of changing definitions—indeed, few categories or terminologies remain constant indefinitely in the budget. Where it is possible to put such divergent data in some common currency, I do so, but in other cases, comparisons are necessarily approximate. In many cases it is possible to dispute the precise meaning of various statistical indicators, but in the aggregate the points made remain valid.

All data appear in constant FY 1986 dollars (except when so noted). An FY86 dollar is worth about 7 percent more than a FY88 one and about 14 percent more valuable than a FY90 dollar. True, different kinds of activities inflate at different rates, and in juggling the books historically certain adjustments must be made. However, consistent with the very high level of aggregation (and emphasis on comparability across all categories), uniform DoD-wide inflation rates are applied.

Finally, this report *does not* address nearly everything. Along with an entire new defense establishment has come a fantastic amount of effort, formal and informal, official and academic, polemic and analytic, to describe and prescribe where the defense program (and almost always the defense budget) has been, is now, may be going, and where it should be going in the near future.

OUTLINE

Important trends in DoD and USAF budgets are examined first. Section II provides a USAF posture and budget overview. The remaining sections then present close-ups of USAF strategic, general purpose, and deployability capabilities. A summary discussion draws lessons for planners contemplating options for the 1990s.

II. THE U.S. DEFENSE BUDGET IN OVERVIEW

Figure 1 tracks the DoD budget over the period FY1946-1986 (Total Obligational Authority). Factoring out Wars, and the Reagan buildup, the overall trend-line is roughly horizontal.

Shown also are various narrative details that motivate budget shifts, as well as presidential tenures, and the average value of defense budgets obtaining during more or less logically consistent defense "epochs."¹ As a general rule, the budget reliably reflects what is going on in the world, though the lead times between stimuli or other developments and budget values are often complex.

Cumulative U.S. spending on defense over this four-decade period ran to about \$9 trillion dollars. Annual levels ranged from a low of \$65 billion in FY47 to a high of about \$300 billion in FY85 as the Reagan defense buildup reached its peak. The average value of the defense budget over this time (for all years) is about \$220 billion.

The three most striking historical facts in this analysis are:

- The magnitude of the recent (since FY79) defense buildup compared with that of even Korean and Vietnam War full-mobilization experience, and the correspondingly high "baseline" from which any decline after 1986 could occur.
- The tendency of the budget to creep down over long periods but jump back up over short periods.
- A slight overall upward growth trend line over time (with peaks and troughs). In FY62-86, the arithmetic average real growth rate is something a little shy of 2 percent per year. When exceptionally good growth years (FYs 1981, 1982, and 1966, in which real growth was about 22 percent, 15 percent, and 10 percent, respectively) are excluded, however, the remaining arithmetic real growth rate is about 0 percent.

¹At the top of the chart, we see budgetary epochs (in order, the demobilization after World War II, the Korean War years, the years of Massive Retaliation, the move to Flexible Response, the Vietnam War years, the "decade of neglect," and the Reagan buildup).

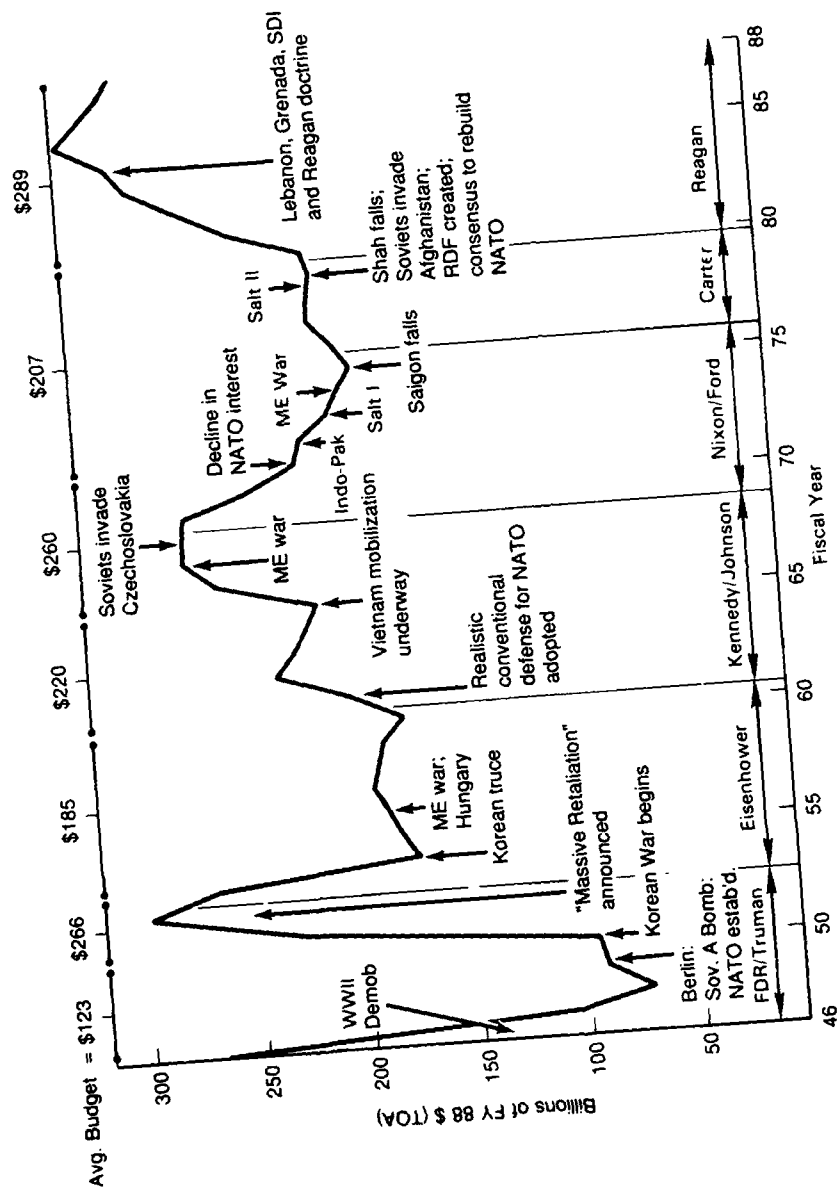


Fig. 1—The U.S. defense budget, FY46-86: An overview

CONSTITUTION OF DEFENSE BUDGET BY SERVICE

The defense budget is divided up by service in Fig. 2, for a period extending back before FY62. Since FY48, the Air Force has had the highest average annual budget (\$72.1 billion), ranging from \$18 billion in FY48 to \$103 billion in FY85. The Navy budget averaged \$63.1 billion annually, ranging from \$24 billion in FY48 to \$103 billion in FY85. The Army budget averaged \$57 billion, and ranged from \$38 billion in FY60 to \$112 billion in FY52.

Note that when budgets grow or compress, service budgets tend to rise or fall together. Historically, the exception to this rule comes during that period when Flexible Response replaced the Massive Retaliation approach to deterrence. On account of that, the Army picked up a good 5 percent of the budget out of USAF's "share." An interesting corollary observation is the relative stability of the Navy. Regardless of the shifting winds of policy or strategy, in the last decade or two, anyway, Navy budget shares tend to be pretty stable from year to year. Overall, there is a tendency toward stabilization of service budget shares.

In peacetime years, defense budgets grow or fall at fairly modest annual rates on a service-by-service basis. A service can be reasonably confident it will have the same real budget next year it had this year, plus or minus no more than \$5 billion. The peacetime exception has been the recent Reagan buildup, in which budget jumps seemed like "wartime" ones: In FY83, for instance, the Navy had a budget some \$11 billion larger than it had in FY82; in FY84, the Army's budget was \$10 billion greater than it was in FY83, and for the same years, the Air Force's jump was a striking \$15 billion. A question of considerable analytic interest, then, concerns the relative "efficiency" with which the services absorbed such dramatic jumps. Table 1 provides a useful summary.

Before FY48, the Army and Navy Departments constituted the entire defense budget, of course. During that time the average annual Army budget was \$120 billion and the average annual Navy budget was \$67 billion. After FY48 the Air Force budget (within the new DoD) increased faster than the Army's or Navy's, at an average annual rate of 6.8 percent (\$2.7 billion). Much of the increase took place between 1949 and 1952, when the Air Force budget increased by 58 percent (\$18.3 billion) annually. After FY52 the budget decreased at a fairly constant rate until FY70, mainly because of movement away from reliance on nuclear forces. Between FY70 and 80 it declined by 4.4 percent (\$3.1 billion) annually. After FY80 it increased by 9.3 percent (\$6.4 billion) annually.

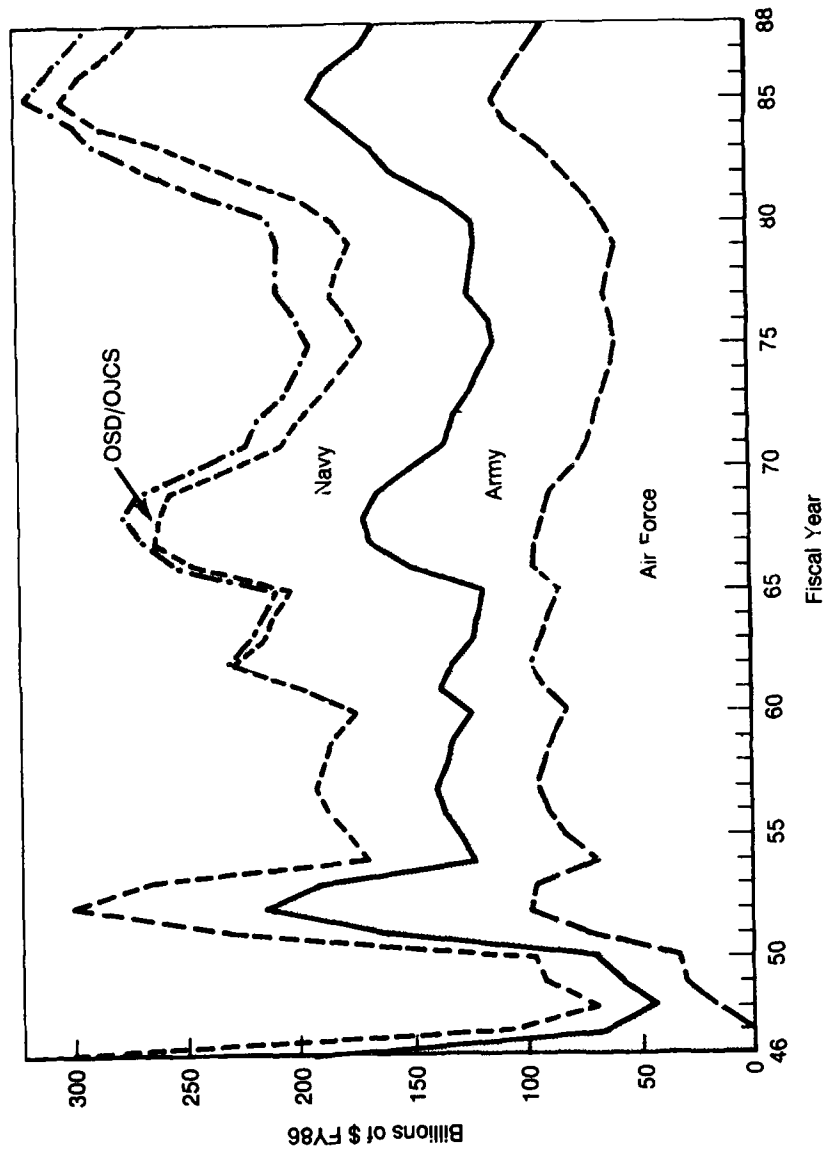


Fig. 2—Constitution of defense budget by service

Table 1

AVERAGE ABSOLUTE VALUES
(Billions of \$ FY86)

Fiscal Year	Army	USAF	Navy	OSD/OJCS
1946-50	64	25	43	0
1951-61	57	80	55	5
1962-65	52	84	62	11
1966-72	74	78	69	15
1973-80	48	56	63	23
1981-86	68	88	90	22
Average				
1946-86	60	72	63	12

The Army budget increased at an average annual rate of 6.8 percent (\$1.4 billion). There were two sharp increases before FY80. Between FY49 and 52, it rose 59.2 percent (\$22.8 billion) annually because of the Korean War. There was another sharp increase between FY66 and 68, when Vietnam requirements led the Army budget to rise by an average of 21.5 percent (\$12.4 billion). After 1980, Army budgets increased by 8 percent (\$4.5 billion) annually.

The Navy budget overall increased at an average annual rate of 5.7 percent (\$2.0 billion) since FY48. Between FY49 and 52, it increased at an average rate of 46.1 percent (\$15.5 billion). From FY66-68 it increased by 6.7 percent (3.9 billion). After FY80, the Navy budget increased again by 7.4 percent (\$5.6 billion).

Finally, the rise in defense agencies, joint activities, etc. should not cause a surprise as most of the big defense agencies didn't exist before 1958. Since that time, of course, they have (together with OSD/JCS costs) grown significantly, from about \$1 billion in 1960 to \$20 billion in 1980. The decline in the non-service-specific spending share after that point follows not because real spending went down, but rather because real spending here held constant while the services grew. These figures grew, over the period FY62-83, from \$1.1 billion to almost \$29 billion per year. With the change in accounting technique applied to retired pay after FY83, the figure dropped to about \$12 billion in FY84; however, there has recently been more defense-wide spending on C³, SDI, etc.

SERVICE SHARES OF TOTAL DEFENSE SPENDING

Figure 3 shows a stacked portrayal of the total DoD budget over time, taking the form of the proportions of the defense budget represented by service entities. The Air Force, during the years of the Massive Retaliation policy, rose rapidly, followed by a gradual decline as the general nuclear deterrent mission was reduced in importance and distributed in part to the Navy by means of the fleet ballistic missile program. After the Korean war the Navy maintained a highly stable share of the total defense budget. There was some OSD/OJCS spending before McNamara, but it increased greatly under him. In some sense, then, the rise of the OSD and OJCS accounts comes at the expense of the combination of the Army and Air Force accounts.

Between FY46 and 86 the Air Force averaged 35 percent of the total defense budget; the Navy averaged 31 percent; and the Army averaged 28 percent. Over the entire period, the Air Force share ranged from 28 percent in FY48 to 48 percent in FY57. The average annual change was an increase of 0.2 percent. The share swelled between FY48 and 57, increasing by 2.2 percent annually. Between FY48 and 86, the Navy share ranged from 27 percent in the mid-1950s to 37 percent in 1948. On the average, it has decreased by 0.07 percent each year, whereas the Army's share of the total defense budget between FY48 and 86 ranged from 23 percent from FY57 to 61 to 40 percent in FY52.

COMPETITIVE SERVICE SHARES OF DEFENSE BUDGET

Figure 4 is provided in the interests of suggesting the outcome of the supposedly vigorous competition for resources by the three services: According to many, the *raison d'être* of any organization is to maximize the size of its budget—as any experienced participant in the defense planning game knows, that is a rather naive view. Nonetheless, this simple overlay of the proportional shares of the Army, Air Force, and Navy does suggest a few items of interest.

The Air Force's slice rises abruptly from about 30 percent in FY50 to more than 45 percent in the mid to late 50s; it subsequently declines rapidly down past 30 percent in a fairly straight line. Compared with its history, the Air Force does poorly up until the beginning of the Reagan years.

The Navy's budget as a share of the defense budget as a whole shows a high degree of "stability." It hovers between the extremes of 27 and 33 percent over most of the period. In the last few years, it has done slightly better than that.

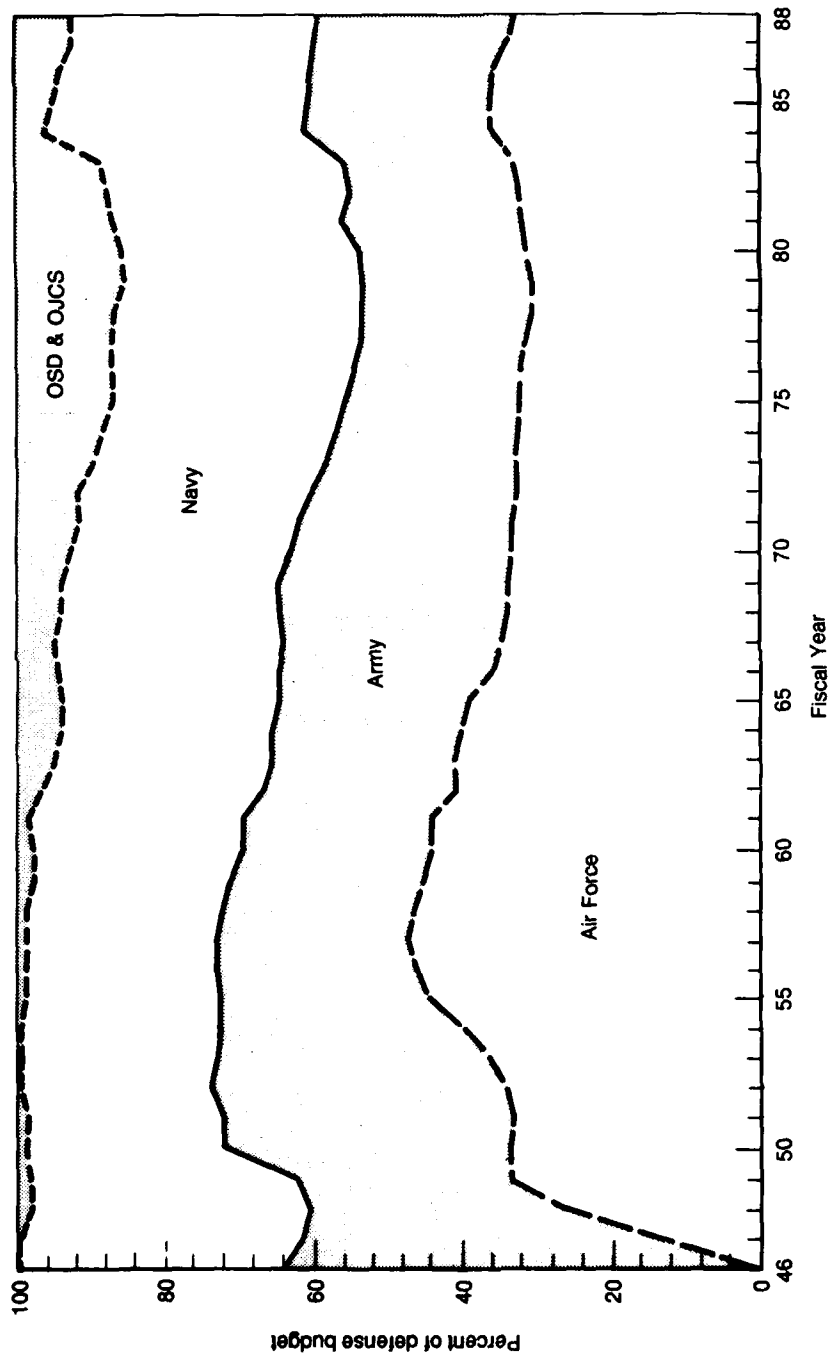


Fig. 3—Service shares of total defense spending

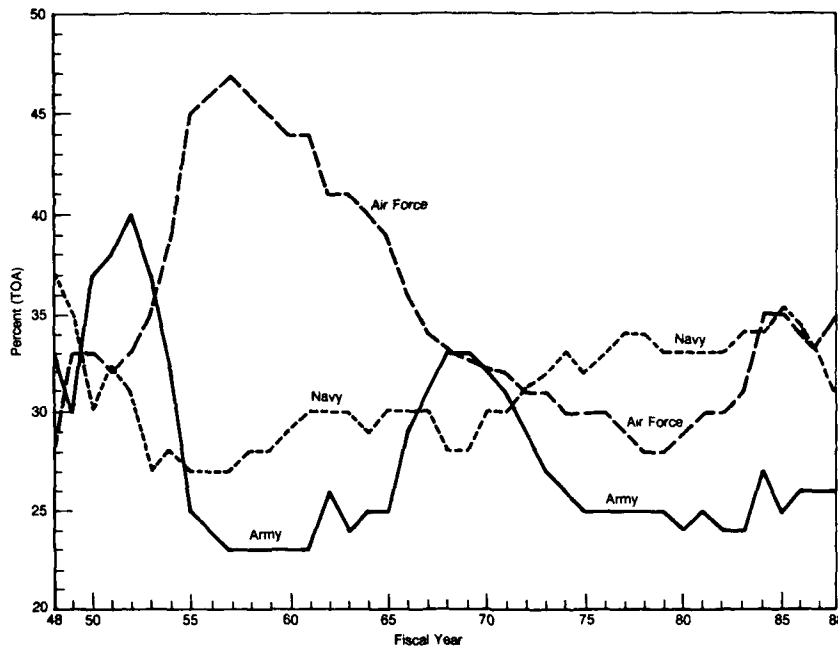


Fig. 4—Competitive service shares of defense budget

Finally, the Army, as might be expected, does “better” during peak war years. See Table 2 for a summary of these and other statistics.

In general, there is a tendency toward stabilization of service shares. If historical patterns persist, Air Force and Navy budget shares will probably be about equal, and both will reside somewhere in the 30–35 percent (of DoD) range. The Army will very likely lag behind the other services by some 5–8 percent, probably falling into the 25–30 percent range. (The Army performance over the period FY46–86 is a solid 30 percent, of course, because wartime years are boom ones for the Army. Without these, the average Army share is more like one-fourth of DoD.) Defense agencies and joint activities fluctuate but hover around 10 percent. One interesting question regarding the future of joint budget items concerns the charging for SDI-related expenses by the various services. It is unclear how defense reform measures strengthening the hand of the Unified and Specified commanders will be translated into budget share shifts.

Table 2
AVERAGE SERVICE SHARES
(Percent)

Fiscal Year	Army	USAF	Navy	OSD/OJCS
1946-50	45	31	35	0
1951-61	28	42	28	1
1962-65	25	40	30	5
1966-72	31	33	30	6
1973-80	25	29	33	13
1981-86	25	33	34	8
Average				
1946-86	30	34	31	5

Over the period from FY48-86, the Air Force has had the highest average share of the Defense budget (35.4 percent), followed by the Navy (30.9 percent) and the Army (27.8 percent).² Between FY55 and 64, one finds a large difference in budget shares. The Air Force averaged 44.6 percent of the total, ranging from 44 percent in FY64 to 48 percent in FY57. The Navy share of the budget averaged 28.5 percent and ranged from 27 percent in FY55-57 to 30 percent in FY61-63. The Army share of the budget was the lowest. Averaging 23.9 percent, it ranged from 26 percent in FY61 to 23 percent in FY57-60. Between FY70 and 72, Air Force, Navy, and Army shares of the budget were nearly equal. After FY80 the Navy share rose by 1.6 percent annually, making it equal to the Air Force share in FY85-86.

²These data differ from those in Table 2 by excluding fiscal years in which the USAF did not exist as an independent service.

III. USAF OVERVIEW

USAF BUDGET BY APPROPRIATION TITLE

Between FY62 and 86 the total Air Force budget averaged \$74.3 billion, and ranged from \$53.7 billion in FY79 to \$103.4 billion in FY85. See Fig. 5. Overall, however, the USAF budget path describes two epochs.

From FY62-80, the budget generally declined overall from a level of about \$90 billion down to some \$60 billion. This reflects, at first, movement away from Massive Retaliation and the changing emphasis on ICBMs, reduction in strategic air defense, and lower levels of routine bomber alert. The overall downward budget drift was, of course, temporarily deflected by requirements of Vietnam. After FY80, though, the budget moved steadily upward, resulting from a major emphasis on procurement of new systems.¹

USAF investment (which includes such items as procurement and research, development, testing, and evaluation—RDT&E) as a whole averaged \$37 billion and ranged from \$21.6 billion in FY75 to \$60.9 billion in FY84. Over the 25-year period, investment ranged from 39 percent of the USAF budget in FY74 to 62 percent in FY84. RDT&E comprised an average of 14 percent of the total budget and ranged from 12 percent to 19 percent of the budget. Procurement averaged 33 percent of the total USAF budget, and averaged \$25.4 billion annually, ranging from \$13 billion in FY75 to \$42 billion in FY85.

The relative budget share going for investment declined during lean budget years. Within the USAF, RDT&E as a title is quite a stable part of the budget: In contrast, procurement varied considerably as a share of the total USAF budget. Procurement made up an average of 32.5 percent of the total budget, ranging from 26 percent in FY72-73 to 41 percent in FY85.

USAF operational accounts averaged \$37 billion between FY62 and FY86, ranging from a low of \$29.5 billion in FY79 to a high of \$43.9 billion in FY69. Military personnel averaged \$16.4 billion annually and

¹More specifically, from 1962 to 1965, the Air Force budget dropped from \$89 billion to \$78 billion. Between FY66 and FY69, the budget averaged about \$87 billion on account of Vietnam. In the years of budgetary deflation (the post-Vietnam "hangover"), the budget fell sharply from \$86 billion in FY69 to a low of \$54 billion in FY75. From FY76 to FY79 the budget held steady, averaging about \$55 billion a year. After FY80, the USAF top-line increased sharply, from \$58 billion in FY80 to an all-time high of \$103 billion in 1985.

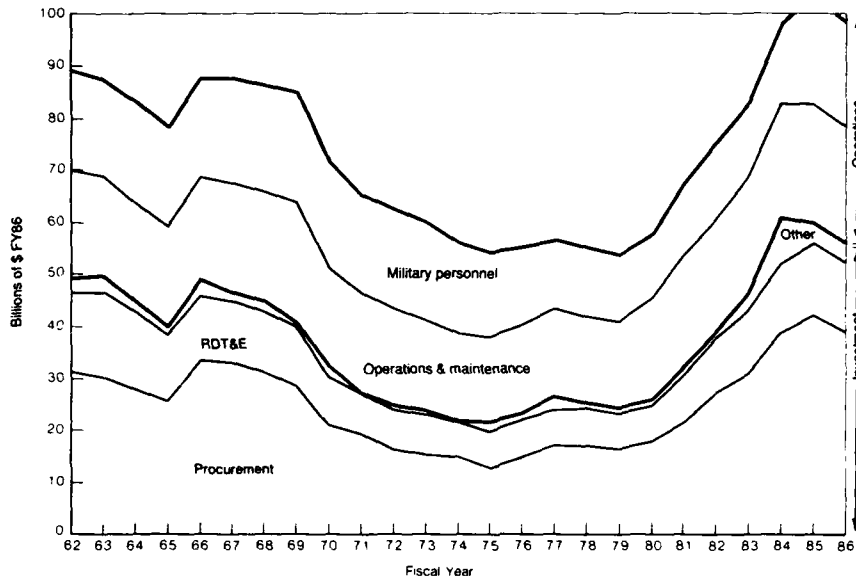


Fig. 5—USAF budget by appropriation title

ranged from \$11.6 billion in FY80 to \$20 billion in FY69. O&M averaged \$18 billion annually, ranging from \$14.5 billion in FY78 to \$22.4 billion in FY69. Operations averaged about half of the total budget and ranged from 38 percent in FY84 to 61 percent in FY74. Between FY66 and 74, operations rose from 44 percent (in FY66) to a peak of 61 percent in FY74. After that, operations fell to 54 percent by FY78, and 38 percent in FY84. By FY86, operations had again risen to 43 percent of the total budget.

The data just presented are summarized in Table 3. Investment as a whole is fairly volatile; and this in turn is driven primarily by movement in the procurement account (especially, the procurement of aircraft account). Major shifts in the USAF budget reflect shifts in the procurement account, then. Also noteworthy from this historical perspective is the stability over time of the O&M title. Despite changes in posture size and operating cost (detailed elsewhere), the absolute amount of this item is fairly constant. Military personnel (less retired pay) is more volatile, reflecting the decline in total personnel end strength. As an aggregate quantity, the operations account (with or without retired pay) is a highly stable entity in absolute budget terms.

Table 3
USAF BUDGET CONSTITUTION BY TITLE
 (Billions of \$ FY86)

	Average Year, Fiscal Year Group					
	62-66	67-71	72-76	77-81	82-86	62-86
Procurement	29.7	26.7	15.0	18.0	35.7	25.0
RDT&E	14.4	10.4	7.2	7.3	12.6	10.4
Other Investment	2.1	1.3	0.9	1.6	4.2	2.0
All Investment	46.2	38.4	23.1	26.9	52.5	37.4
MilPers, Less						
Retirement Pay	18.8	20.0	17.3	13.1	15.1	16.9
O&M	19.8	20.8	17.2	18.3	22.2	19.7
All Operations	38.6	40.8	34.5	31.4	37.3	36.6

USAF BUDGET BY APPROPRIATION TITLE: PROPORTIONS

Figure 6 recasts the data presented in Fig. 5, this time in proportional, not absolute, terms. The chief message conveyed is that the relative budget share going for investment declined during modest budget years; procurement more than any other account is a sort of budget "slack variable." In fact, "favorable" budget years for the USAF could be any fiscal year in which investment comes close to or exceeds half of the total USAF budget.

Within the USAF as a whole, R&D as a title is quite stable: It is, in proportional terms, a "fenced" part of the budget. Between FY62 and 86, R&D averaged 13.8 percent of the USAF budget.² In contrast, as suggested, procurement varies considerably. It made up an average of 32.5 percent of the total budget, ranging from 26 percent in FY72-73 to 41 percent in FY85.

Investment as a whole made up, on average, 49.2 percent of the budget, ranging from 39 percent in FY74 to 62 percent in FY84. In FY63, investment accounted for 57 percent of the budget, falling to 51

²R&D ranged proportionally from 12 to 19 percent. However, most of the values in excess of 14 percent came during the early part of the period during which many weapon systems, especially some strategic systems, were under development.

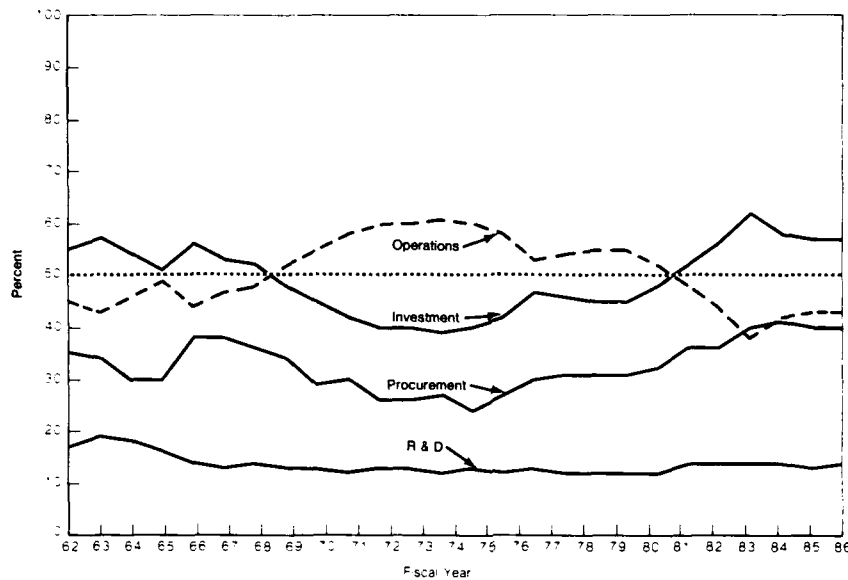


Fig. 6—USAF budget by appropriation title: Proportions

percent in FY65. After FY66, investment began a long period of decline, to 39 percent in FY74. Between FY75 and 78 it rose from 40 percent to 47 percent. Investment then leveled off until FY80, averaging 46 percent. After 1980, it rose to a peak of 62 percent in FY84.

Operations averaged about half of the total budget from 38 percent in FY84 to 61 percent in FY74. Operations rose from 44 percent in FY66 to a peak of 61 percent in FY74. After that, operations fell to 54 percent by FY78 and 38 percent in FY84. By FY86, operations had again risen to 43 percent of the total budget.

Table 4 recapitulates this discussion. As noted before, fluctuations in the overall investment and operations account reflect one of two things: (1) contingency requirements (notably Vietnam) that push up the budget as a whole, but drive operational expenses even faster; and (2) the fate of the USAF budget top-line: When budgets are low, the relative share of the budget represented by operations increases (since there are limits below which it cannot fall), and vice versa.

Table 4
USAF BUDGET CONSTITUTION BY TITLE, FY62-86
(Percent)

	Average Year, For Group of Fiscal Years					
	62-66	67-71	72-76	77-81	82-86	62-86
Procurement	33	33	26	31	39	32
RDT&E	17	13	13	13	14	14
Other Investment	5	2	1	2	4	3
All Investment	55	48	40	46	57	49
MilPers, Less						
Retirement Pay	22	25	30	23	17	23
O&M	23	27	30	31	26	28
All Operations	45	52	60	54	43	51

USAF BUDGET: INVESTMENT

Figure 7 provides a more detailed view of USAF investment. All kinds of procurement averaged \$25.4 billion annually, ranging from \$13 billion in FY75 to \$42 billion in FY85. Overall, procurement made up an average of 68 percent of the total investment budget. It ranged from 62 percent in FY64 to 89 percent in FY65. Procurement of aircraft has tended to account for the majority of the movement in the USAF investment top-line. Indeed, as Fig. 7 shows, all of the elements of the investment budget tend to fall into fairly stable ranges (in both absolute and proportional terms), save aircraft procurement, which averaged \$14.2 billion annually, ranging from \$6.3 billion in FY73 to \$26.2 billion in FY85. On average, it made up 37 percent of the total investment budget.

Procurement of missiles averaged \$5.2 billion annually, ranging from \$2.2 billion in FY79 to \$9.9 billion in FY63. It made up an average of 14 percent of the total USAF investment budget, and ranged from 9 percent in FY66 and 1979 to 21 percent in FY63-64. Other procurement averaged \$5.6 billion, ranging from \$3.4 billion in FY75 to \$9 billion in FY67. Other procurement averaged 15 percent of the total USAF investment budget, ranging from 8 percent in FY63-64 to 25 percent in FY74.

RDT&E averaged \$10.4 billion from FY62-86, ranging from \$6.7 billion in FY79 to \$16.4 billion in FY63. RDT&E constituted an average of 28 percent of the total USAF investment budget, and ranged

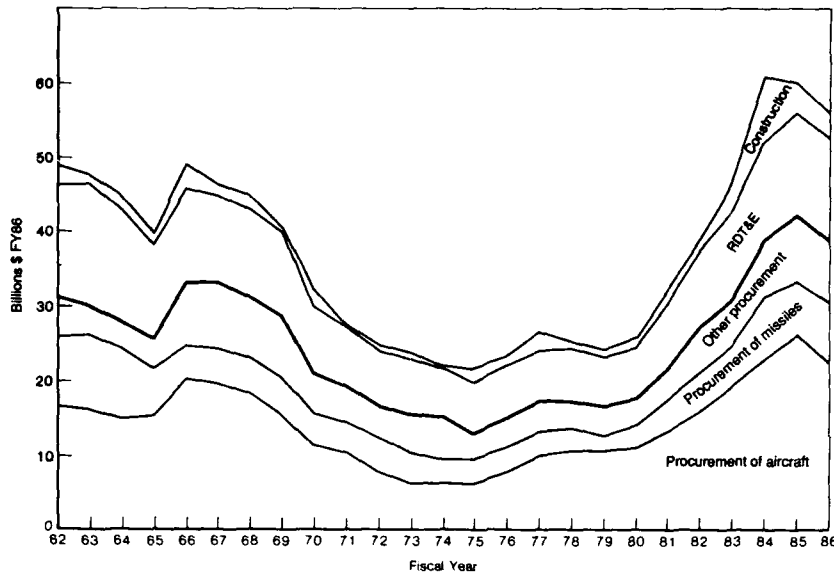


Fig. 7—USAF budget: Investment

between 22 percent in FY84 to 34 percent in FY63-64. Finally, construction averaged \$1.5 billion annually between FY62-86. That account made up an average of 4 percent of the total investment budget.

Though it is impossible to quantify in any absolute terms, it is probable that the major procurement effort under the Reagan administration went a long way toward mitigating the effects of the relative period of underinvestment in the 1970s. Between FY81 and 86, cumulative investment spending was \$295 billion, as opposed to \$147 billion during the preceding six fiscal years.

USAF BUDGET: OPERATIONS

Figure 8 takes an analogous closeup look at historical USAF operational spending.³ The operational accounts shown—operations and maintenance, and military personnel—are stacked upon each other.

³In this figure the values for FY85-86 reflect the inclusion of military retired pay (which previously had appeared in a DoD-wide account). This is seen in the jump in the military personnel account for those years.

The shaded area appearing at the top of each stack is that O&M or personnel allocation for the Guard and Reserve.

Compared with the volatile investment patterns just presented, USAF's operational budgets tended to remain constant over time. O&M amounted to a surprisingly constant \$20 billion over the entire quarter century period: The dip in the *total* operational budget from a fairly "typical" \$40 billion level down toward \$30 billion as the 1970s proceeded is mainly a result of a decline in military personnel, from an active personnel strength of some 700,000 in about FY73 to one of about 600,000 in FY84. Military personnel averaged \$17.2 billion over these 25 years. It ranged from \$12.3 billion in FY80 to \$20.5 billion in FY69.⁴

Another apparent development is the steadily increasing level of operational spending commanded by the Air Reserve Forces (ARF). The Guard and Reserve accounted for an average of 8.3 percent of operations and maintenance spending, ranging from 3.1 percent in FY63 to 13.1 percent in FY82. The Guard and Reserve O&M budget averaged \$1.6 billion annually. Its personnel budget averaged about \$0.8 billion annually, ranging from \$0.4 billion in FY63 to \$1.6 billion in FY83.

Again, a summary portrayal is helpful (Table 5) to highlight developments. We see clearly the steadily growing role of the ARF in the budget, a role that is also reflected in the missions and functions of the reserves generally.

USAF VS. DoD-WIDE BUDGETS: COMPARISON OF RELATIVE TITLE SHARES

Figure 9 paints a not surprising feature of certain qualitative differences between the USAF and the U.S. defense establishment as a whole. Shown are the shares of the USAF and total DoD budgets going for R&D, procurement, and operations (the sum of personnel and O&M).

The USAF budget generally follows the shape of that of the DoD budget with a few exceptions. First of all, compared with DoD, the USAF is more R&D-intensive and more procurement-intensive in relative terms—the USAF is, put simply, a high tech service. Second, USAF investment surged during the Reagan administration years. In that respect, the burst in USAF investment during the early 1980s can be seen as not just an increased emphasis by the Reagan administration on USAF

⁴The U.S. military adopted the all-volunteer force in 1973.

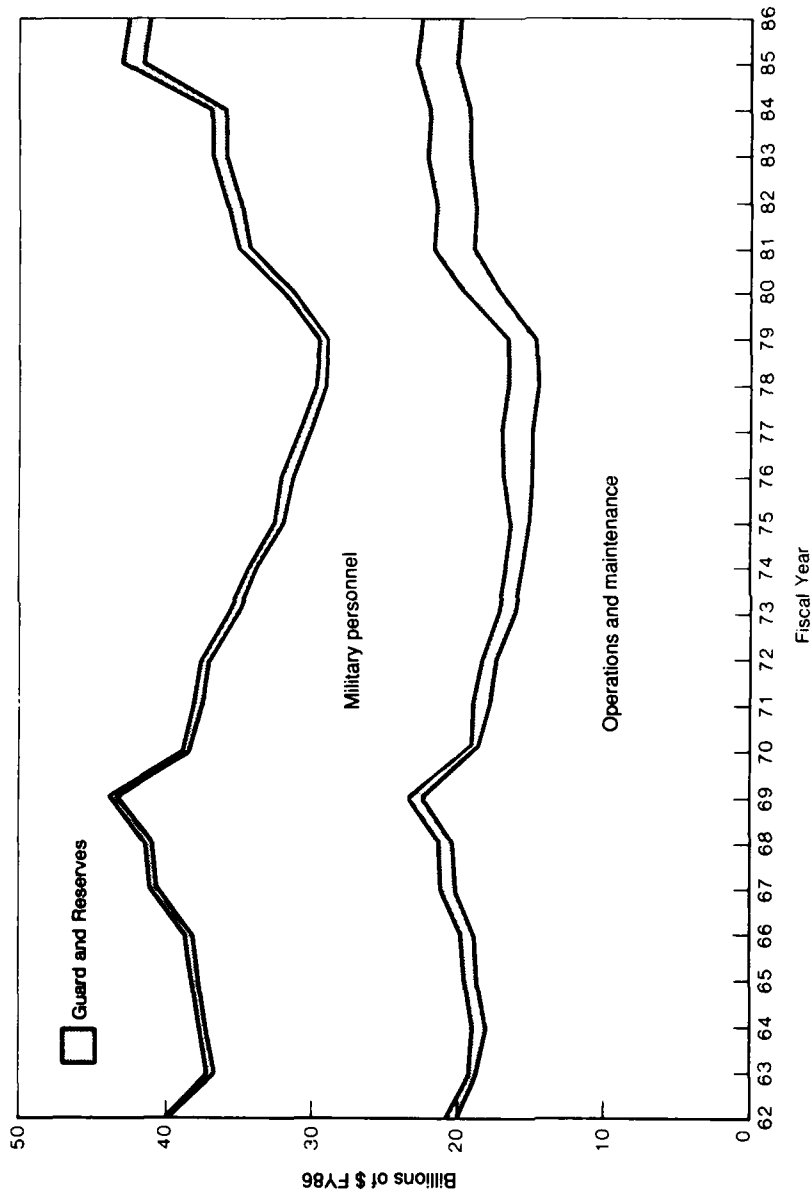


Fig. 8—USAF budget: Operations

Table 5
BREAKOUT OF USAF INVESTMENT TITLES, FY62-86
(Percent)

	Average Year, Groups of Fiscal Year					
	62-66	67-71	72-76	77-81	82-86	62-86
All USAF:						
O&M	19.8	20.8	17.2	18.3	22.2	19.7
MilPers	18.8	20.0	17.3	13.1	15.1	16.9
Total	38.6	40.8	34.5	31.4	37.3	36.6
Guard and Reserve:						
O&M	0.8	1.0	1.3	2.3	2.8	1.6
MilPers	0.5	0.5	0.7	0.7	1.2	0.7
Total	1.3	1.5	2.0	3.0	4.0	2.4
Reserves as Percent of Active (retired pay factored out)	3	4	6	10	11	7

programs, but also as an initiative designed to undo the effects of deferred investment through the mid- and late-1970s.⁵ Third, based on the first point cited, one expects the DoD in general to be more operationally intensive than the USAF. That the USAF operations data given exceed those for the DoD in the mid-1970s perhaps further suggests the *underfunding* of USAF investment at that time. Overall, USAF as a share of all DoD spending averaged 33 percent annually, ranging from 28 percent in FY78-79 to 41 percent in FY62-63. USAF as a percent of all DoD procurement averaged 38 percent annually, and ranged from 34 percent in FY72 to 45 percent in FY65. USAF R&D as a percent of all DoD R&D averaged 43 percent annually, and ranged from 35 percent in FY79 to 55 percent in FY63.

⁵It also follows from the great diversity of constituent USAF programs: the early 1980s corresponded not only with a general defense buildup, but with a vigorous strategic modernization initiative in particular.

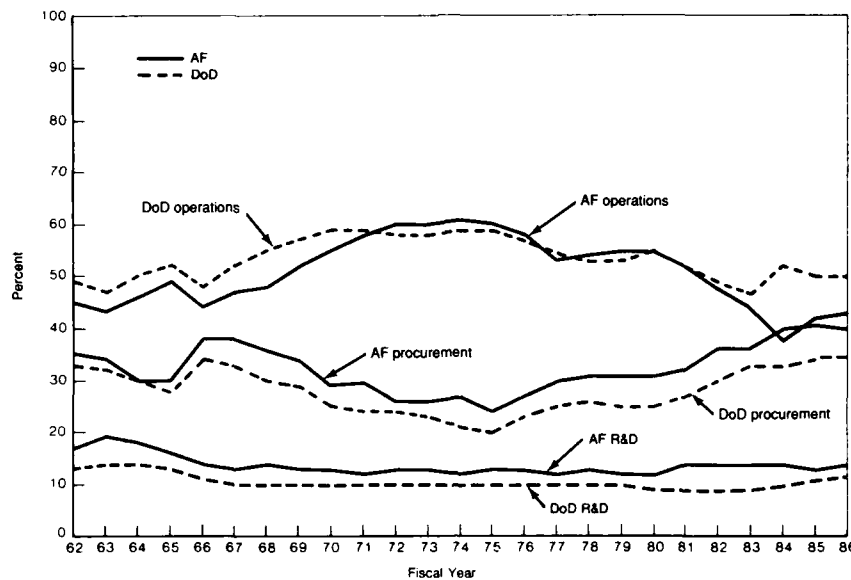


Fig. 9—USAF vs. DoD-wide budgets: Comparison of relative title shares

USAF SPENDING AS A SHARE OF ALL DoD SPENDING: SELECTED TITLES

The data presented in the previous figure are shown in Fig. 10 revised so that USAF R&D, procurement, and total top-line data are each shown as a share of the DoD total. The lines shown here are overlaid, not stacked. The same general points made in Fig. 9 are apparent again, but with some twists.

First of all, USAF's *investment* accounts as a share of the corresponding DoD-wide investment accounts correlate to some degree with the USAF's stake in the defense budget as a whole. Relatively "better" years for the USAF (as a share of the DoD budget) mean that the USAF consumes more of the overall DoD investment budget in those years. Thus, "good Air Force years" in some ways means good Air Force *investment* years.⁶ The points made earlier about the USAF as an investment-intensive service stand. There was a modest "lag time" in booms in R&D vs. booms in investment (as proportions of

⁶This is not necessarily the case with other services, notably the Army: Often, more Army funding means not so much more Army investment funding as it does additional Army *operational* (as well as investment) funding.

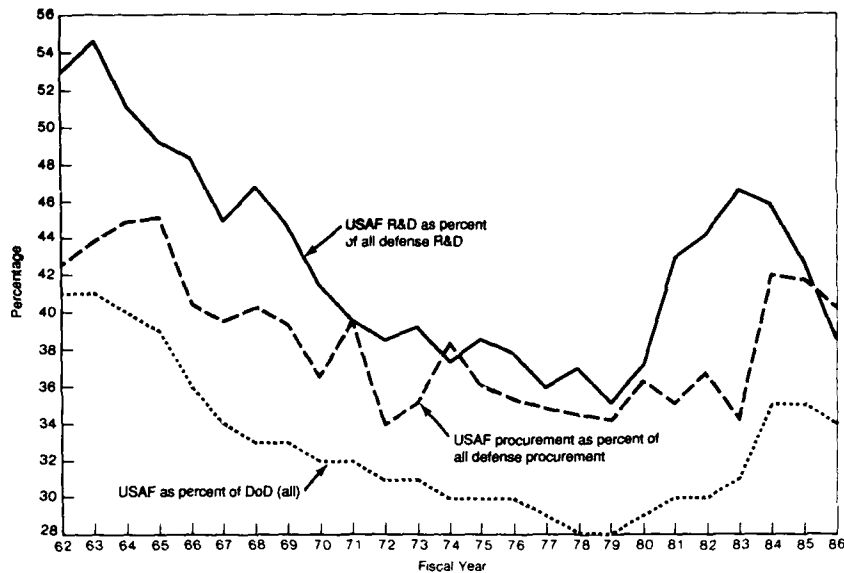


Fig. 10—USAF spending as a share of all DoD spending: Selected titles

DoD spending). Finally, USAF procurement was somewhat unstable as a share of DoD procurement from year to year.

USAF BUDGET BY MAJOR FORCE PROGRAM

Historical USAF spending over the period (FY62–86 is broken out by Major Force Program (MFP). The “combat” programs I–VI may be distinguished from the “support” programs VII–X.

- USAF MFP I—Strategic Nuclear Forces—averaged \$16.2 billion over the 25 years, from \$7.5 billion in FY78 to \$37.4 billion in FY62. Apparent in these data is the steady move away from nuclear deterrence as a pivot of U.S. strategy.
- MFP II—General Purpose Forces—averaged \$18.2 billion over 25 years, from \$12.4 billion in FY64 to \$25.8 billion in FY85. Apparent are the effects of the Vietnam War and two major efforts to enhance U.S. conventional force capabilities, mainly in NATO—one in the early 1960s and one in the late 1970s and 1980s.

- MFP III—Intelligence and Communications—averaged \$9.7 billion over 25 years, ranging from \$6.1 billion in FY80 to \$14.8 billion in FY86.
- MFP IV—Airlift—averaged \$4.1 billion annually and ranged from \$1.7 billion in FY74 to \$6.9 billion in FY86. The trend here is in general upward, following the pattern of MFP II.
- MFP V—Guard and Reserve Forces—averaged \$3.2 billion annually and ranged from \$2 billion in FY62–63 and FY69 to \$5.5 billion in FY85. The Program V budget rose in almost every year since 1962, reflecting increasing USAF reliance on all elements of the total force.
- MFP VI—Research and Development—averaged \$7.1 billion and ranged from \$5.2 billion in FY71 to \$10.4 billion in FY83. It was lowest between FY68 and FY80 when it averaged \$5.7 billion. The Program VI budget was highest during the FY83–86 buildup when it averaged \$9.9 billion.
- The support MFPs, MFPs VII-X (7: Central Supply & Maintenance; 8: Training, Medical, and other Personnel; 9: Administration and Associated Activities; 10: Support of Other Nations) averaged \$22.4 billion annually and ranged from \$16.7 billion in FY80 to \$27.7 billion in FY85. At the time of this writing, an eleventh MFP (Special Operations Forces) has been added, but it is not pertinent to the budget period described here.

These data are summarized in Table 6 for easy reference. Again, the shifts in major accounts (especially Strategic and General Purpose

Table 6

USAF BUDGET CONSTITUTION BY MFP
(Billions of \$ FY86)

Program	Average Year, Group of Fiscal Years					
	62-66	67-71	72-76	77-81	82-86	62-86
Strategic Forces	26.9	15.8	10.3	8.9	19.0	16.2
General Purpose Forces	15.8	21.3	13.3	16.6	24.7	18.3
Intelligence and Communications	10.9	11.2	7.6	6.9	12.1	9.7
Airlift	4.5	5.1	2.2	2.9	5.3	4.0
Guard and Reserve	2.0	2.2	2.8	3.9	5.8	3.3
R&D	8.1	5.8	5.8	6.3	9.3	7.1
Support (VII-X)	16.6	17.8	15.6	12.8	15.4	15.6

Forces) associated with strategic shifts are quite clear. Also of note is the stability, in absolute terms, of the Support MFPs.

USAF MFP BREAKOUT BY SHARE

The data appearing in Fig. 11 are now given in a proportional format (Fig. 12), permitting us to better track relative USAF major force program priorities over time. As with Fig. 11, MFPI declines in association with the movement away from Massive Retaliation, and MFP II and related GPF MFPs grow in association with the adoption of Flexible Response, Vietnam requirements, and so on. If we exclude Programs I and II, the rest of the budget tends to maintain a degree of internal balance over time in terms of the share of the USAF budget going to each MFP.⁷

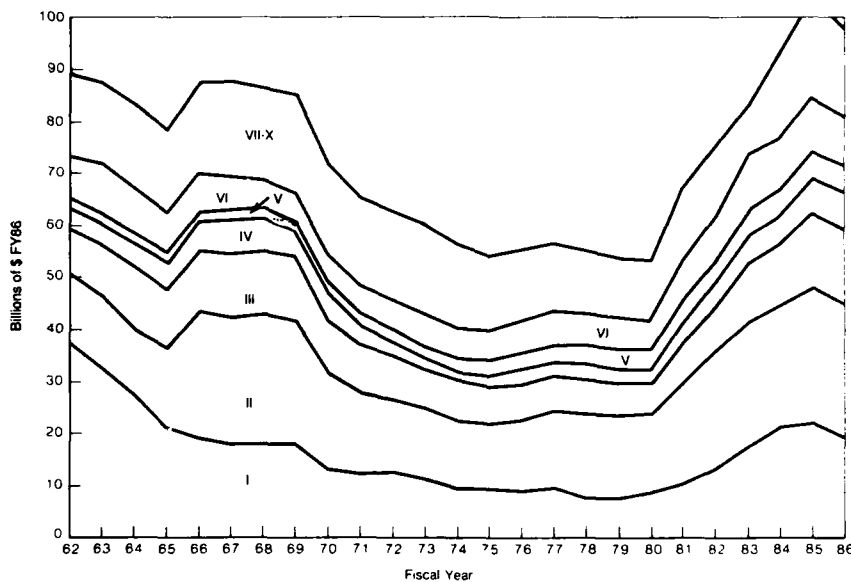


Fig. 11—USAF budget by major force program

⁷In short, with the exception of intermittent developments involving conventional forces, the MFP structure of the USAF budget tends to remain constant over time. It is, moreover, not too extreme to say that conventional buildups are paid for, in some sense, out of the strategic forces budget.

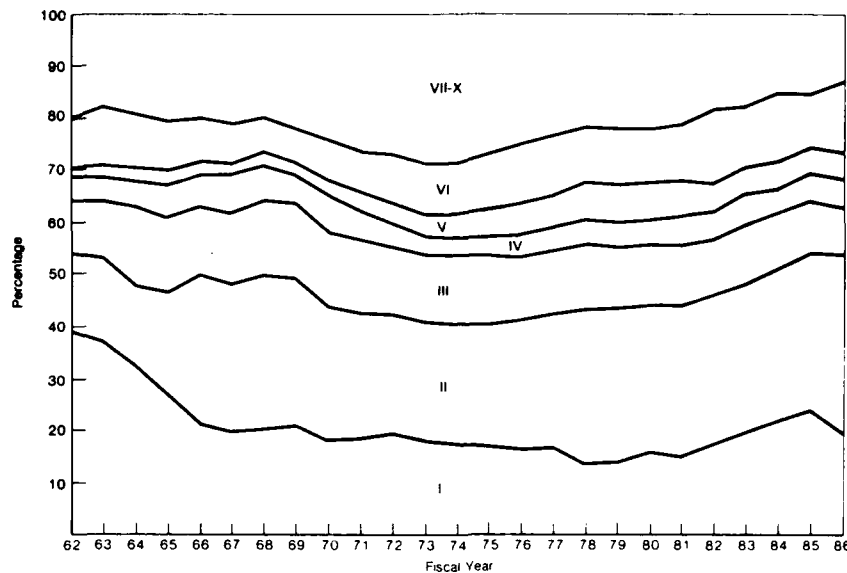


Fig. 12—USAF MFP breakout by share

- From FY62 to FY86, MFP I made up an average of 21 percent of the Air Force budget, ranging from 14 percent in FY78 to 40 percent in FY62. Between FY62 and 65 the share was at its highest, averaging 34 percent.
- MFP II averaged 25 percent of the total and ranged from 15 percent in FY62 to 30 percent in FY82. From FY62-65 the MFP II share of the budget was at its lowest, averaging 16 percent. It was at its highest between FY78 and 83, averaging 29 percent annually.
- MFP III averaged 13 percent of the total and ranged from 10 percent in FY62 to 16 percent in 1985.
- MFP IV averaged 5 percent and ranged from 3 percent in FY74 to 7 percent in FY85.
- MFP V averaged 5 percent of the total and ranged from 2 percent in FY62 to 7 percent in FY77-78.
- MFP VI averaged 10 percent of the budget and ranged from 6 percent in FY68 to 13 percent in FY83.
- MFP VII-X averaged 22 percent of the total budget and ranged from 17 percent in FY86 to 29 percent in FY73.

Table 7 is a proportional representation of these data. As before, the shifts in strategy stand out. As with the operationally oriented support titles, the Support MFPs rise in proportional terms during times of either combat contingency or poor overall budget experience. Note the steady but modest growth in both airlift and guard and reserve forces and the relative stability, in percentage terms, of the Intelligence and Communications and R&D MFPs (III and VI).

DoD ANNUAL REAL BUDGET GROWTH RATE COMPARED WITH THAT OF USAF

Figure 13 compares real change from year to year in the USAF budget with that of DoD. The interesting feature concerns those periods in which the USAF either "bettered" or "lagged" DoD growth. In general, the USAF budget evolves, from year to year, in a way that corresponds strongly with the fate of DoD overall. The most noteworthy exception to this rule comes during the Reagan years when it seems that USAF was somehow a modest beneficiary of some extra budget attention. However, USAF lagged DoD during the Vietnam years. This resulted from a greater emphasis on immediate operational requirements (involving higher Army and Marine budgets).

Less explainable is the somewhat poor record of the USAF compared with DoD during the "decade of neglect." If that appellation is indeed a legitimate one, this period can be considered a period of even *greater* neglect (measured in this fashion) as far as USAF was concerned.

Table 7

USAF BUDGET CONSTITUTION BY MFP, FY62-86 (Percent)

Program	Average Year, Group of Fiscal Years					
	62-66	67-71	72-76	77-81	82-86	62-86
Strategic Forces	31.7	19.9	17.9	15.2	20.7	21.1
General Purpose Forces	18.6	26.9	23.1	28.4	27.0	24.8
Intelligence and Communications	12.8	14.1	13.1	11.9	13.2	13.0
Airlift	5.3	6.4	3.8	5.0	6.4	5.4
Guard and Reserve	2.4	2.8	4.8	6.7	5.5	4.4
R&D	9.6	7.3	10.0	10.8	12.2	10.0
Support (VII-X)	19.6	22.6	27.3	22.0	16.8	21.3

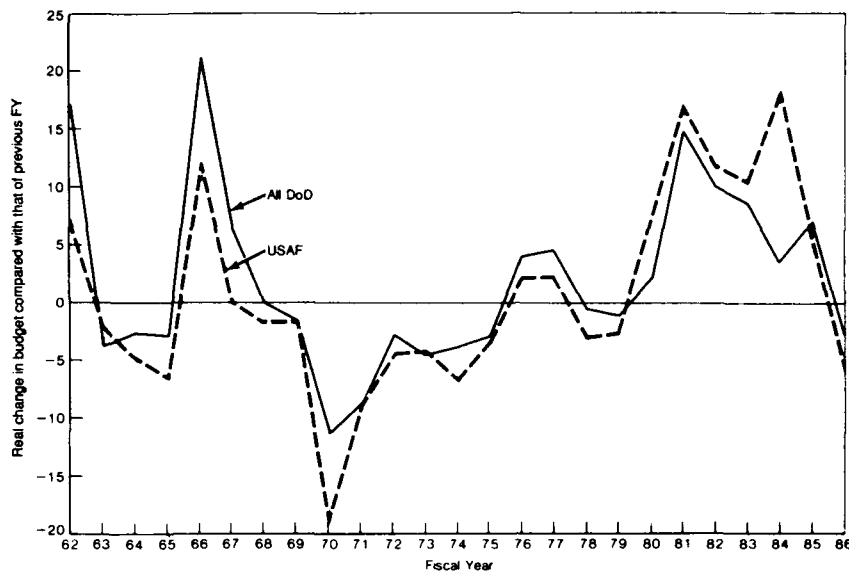


Fig. 13—DoD-wide annual real budget growth (decline) rate compared with that of USAF

Between FY62 and 86 DoD real budget growth averaged about 1.9 percent annually; annual rates ranged from a 10 percent decline in FY70 to a 20.6 percent increase in FY66. USAF real budget growth averaged 0.8 percent annually, with rates ranging from a decline of 15 percent in FY70 to an increase of 13.8 percent in FY84. Both DoD and USAF budgets increased sharply during certain years between FY66 and FY81. In FY66, DoD increased 21 percent, USAF 11.4 percent. In FY81, DoD increased by 13.3 percent, and USAF increased by 14.9 percent. After FY81, USAF continued to grow at an average of 14.4 percent annually until FY84 (when it reached 18.3 percent). From FY80-85, USAF real growth was greater than DoD's by an average of 5.1 percent each year.

These data are summarized in Table 8 in comparative format. Note that the USAF, on average, does relatively "worse" in terms of real growth than DoD, with the notable exception of the Reagan buildup. That fact is primarily attributable to a number of "one time" strategic and (to a lesser

Table 8
AVERAGE REAL GROWTH RATES DoD VS. USAF
 (Percent)

	Average Year, Group of Fiscal Years					
	62-66	67-71	72-76	77-81	82-86	62-86
DoD	5.8	-2.9	-2.0	4.0	5.2	2.0
USAF	1.1	-6.1	-3.3	4.2	8.1	0.8

extent) mobility modernization initiatives pursued by the Reagan administration on top of other get-well and expansion measures.⁸

USAF MILITARY PERSONNEL PROFILE

Figure 14 provides a perspective on both historical Air Force manning and the programmatic activities in which USAF manpower have been engaged over time. In stacked graphical format are personnel assigned to MFPs I (strategic forces), II (general purpose forces), and VIII (training, manpower, and other personnel). These three categories are broken out to show that usually about 2/3 to 3/4 of all active USAF personnel fall into these categories. Shown also, in absolute terms, are selected Guard and Reserve manning levels. (The dashed line demonstrates the size of the ARF as a function of USAF manpower; compare with the right-hand horizontal scale.)

- MFP I USAF military personnel averaged 185,000 and ranged from 114,000 in FY85-86 to 369,000 in FY62. From FY62 to 71 MFP I personnel dropped most sharply. During those years the average annual decline was 22,000. After FY71 personnel continued to decline but at a slower rate.
- USAF MFP II personnel averaged 188,000 over the 25 years and ranged from 141,000 in FY76 to 280,000 in FY68. From 151,000 in FY63, personnel in MFP II rose to a high in FY68, and then fell to a low in FY76. Between FY77 and 79, the average was 156,000. From FY81 on, personnel in MFP II increased steadily from 163,000 to 189,000.

⁸Also partially explaining the "better than DoD" growth rate for the period FY82-86 is a sort of accounting artifact, the revision in retired pay accounting techniques.

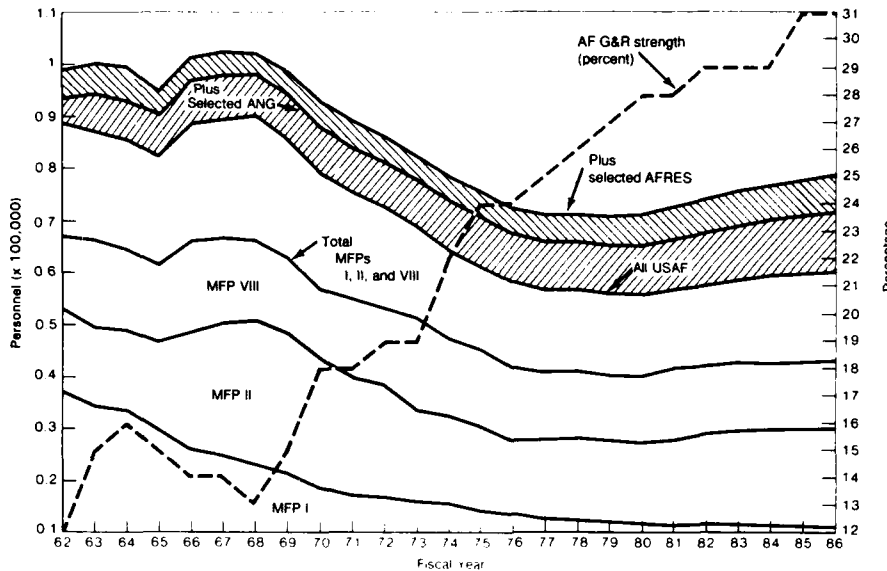


Fig. 14—USAF military personnel profile
(Active and reserve)

- Personnel in MFP VIII averaged 144,000 and ranged from 122,000 in FY84 to 177,000 in FY73. From FY62–76 MFP VIII was not very stable, largely on account of certain developments including Vietnam requirements. After FY76 strength leveled off to an average of 129,000, and the range 122,000–130,000.
- USAF personnel in selected ANG units averaged 89,000 over the 25-year period, and grew from 50,000 in FY62 to 111,000 in FY86. Personnel totals in selected ANG units increased sharply in FYs 1963, 1969, and 1970. USAF personnel in Selected AFRES units averaged 55,000 over the 25 years and ranged from 43,000 in FY68 to 77,000 in FY86. Overall, Air Force G&R strength ran at 22 percent of total USAF personnel from FY62–86, and ranged from 12 percent in FY62, to 31 percent in FY86.

These data appear in Table 9. A special focus here is on the increasing role of reserve personnel in the total USAF mission. Note the downward movement in the USAF manpower complement over time, even as Vietnam requirements or those of the peacetime Reagan buildup took place. Finally, one reason for this decline in personnel

Table 9
USAF MILITARY PERSONNEL PROFILE
 (Thousands)

	Average Year, Group of Fiscal Years					
	62-66	67-71	72-76	77-81	82-86	62-86
All USAF Active	865	842	652	565	595	704
Guard/Reserve	126	131	139	150	177	145
AF Reserve	55	47	47	56	71	55
Air National Guard	71	84	92	94	106	90
Total USAF	991	973	791	715	772	849
Reserves as Percent of Active	15	16	21	27	30	21
Total USAF MilPers Budget, Less Retirement Pay (\$B,FY86)	18.8	20.0	17.3	13.1	15.1	16.9
MilPers/Active Personnel (\$K)	21.7	23.8	26.5	23.2	25.4	24.1

end-strength was a steady but modest overall growth trend in the cost of personnel in real terms over time.

USAF HISTORICAL SQUADRON BY SQUADRON PROFILE

Figure 15 shows the (stacked) makeup of the USAF over time measured by number of squadrons of different type. The bottom layer (with the sparse lines) refers to strategic forces. From the bottom up, these consist of strategic bomb squadrons (SBS, both heavy and medium, H/M), ICBMs, and "other strategic squadrons" (a diverse category including air refuelers, airborne command posts, Snark cruise missile squadrons, strategic defense forces, etc.). The next layer—General Purpose Forces—is composed mainly of tactical fighter squadrons; but there is also an "Other General Purpose" category, which, again, is quite diverse internally and includes reconnaissance, tactical missile, and other forces. Active USAF lift squadrons appear in the next slice. Finally come the two ARF components.

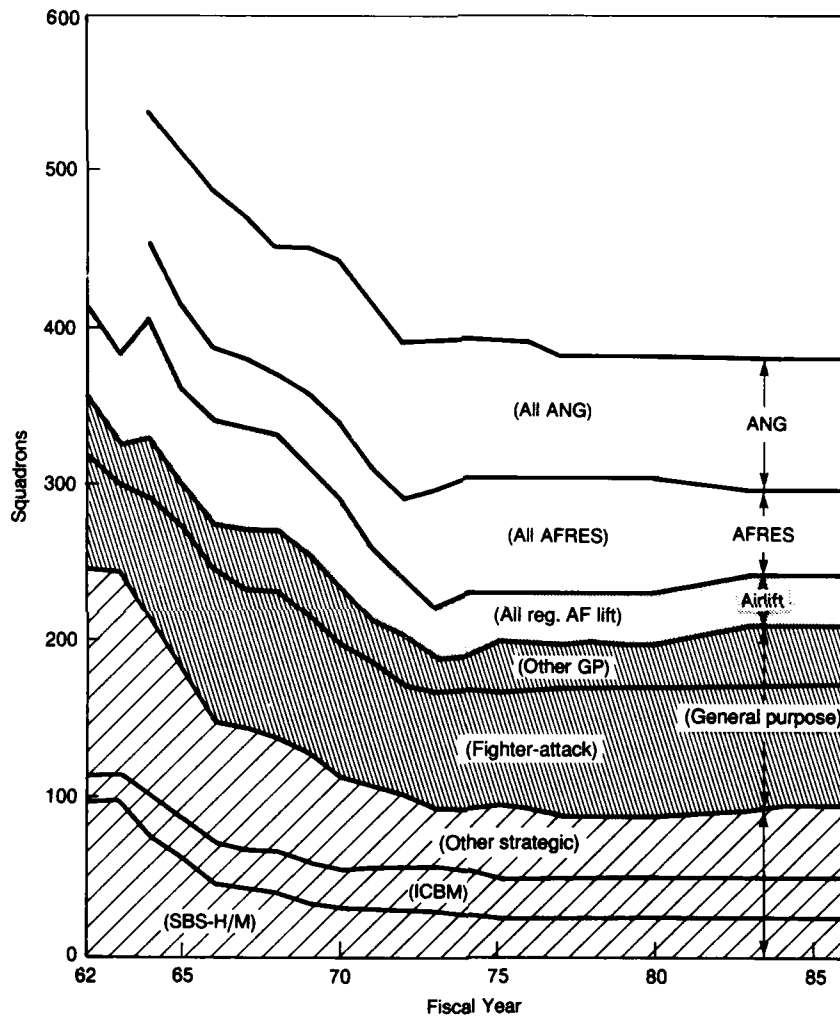


Fig. 15—USAF historical squadron-by-squadron profile

Acknowledging the difference in meaning of "squadron" and many other ambiguities, we can nonetheless make some general statements about the structure of the USAF over time. First, the posture declined in many ways over the period FY62-72, from a level of almost 600

squadrons down to about 400 total squadrons. A great part of this decline came in the strategic area.

After the end of the Vietnam war, both the absolute size of each category and the internal mix within each major mission category tend to remain constant. It may not be too dramatic to say that after Vietnam the USAF discovered a level that was effectively "stable," in terms of force structure anyway.

USAF FLYING HOURS AND OPERATIONAL COSTS

Figure 16 gives basic data on total USAF flying hours and provides a rough measure of absolute flying hour cost trends. From FY62-86 flying hours averaged 4.9 million per year and ranged from 3.1 million in FY76-78 to 7.8 million in FY69. Through the peak Vietnam years, the USAF as a whole flew some 6.5-8.0 million hours per year. Then this figure declined abruptly to a stable level of about 3 million hours per year by FY76. This decline was primarily a function of two things: the response to increased operating costs (e.g., fuel costs), and the decreasing number of aircraft in the USAF inventory.

A crude notional indicator of the cost of a flying hour (computed here by dividing the total USAF O&M account by the total number of flying hours) stays in the \$3,000/hour range through the early 1970s. Following upon the contraction of the USAF posture and also (perhaps most significantly) because of abrupt increases in energy prices, the cost of flying jumps up to a level more like \$6,000/hour. Air Force O&M spending per flying hour averaged \$4,000 over the 25 years from FY62-86. The figure ranged from \$2,800 in FY64, FY68 and FY70 to \$6,500 in FY81, FY83 and FY85. By this measure, the average annual rate of increase overall was \$100 per hour per year (3.4 percent).

ARF CONTRIBUTION TO SELECTED MISSION AREAS

The full and optimal utilization of Guard and Reserve capabilities is a top USAF priority. Figure 17 is a simple portrayal of the Air Reserve Forces' contribution to various missions. The results speak for themselves. First, traditionally, the Air National Guard has provided *combat units*, such as fighter-attack squadrons, whereas Air Force Reserve units have played a larger role in combat *support-oriented* forces—for instance, tactical airlift. Second, much capability in the total ARF does not exist in the form of combat units, but rather of personnel that

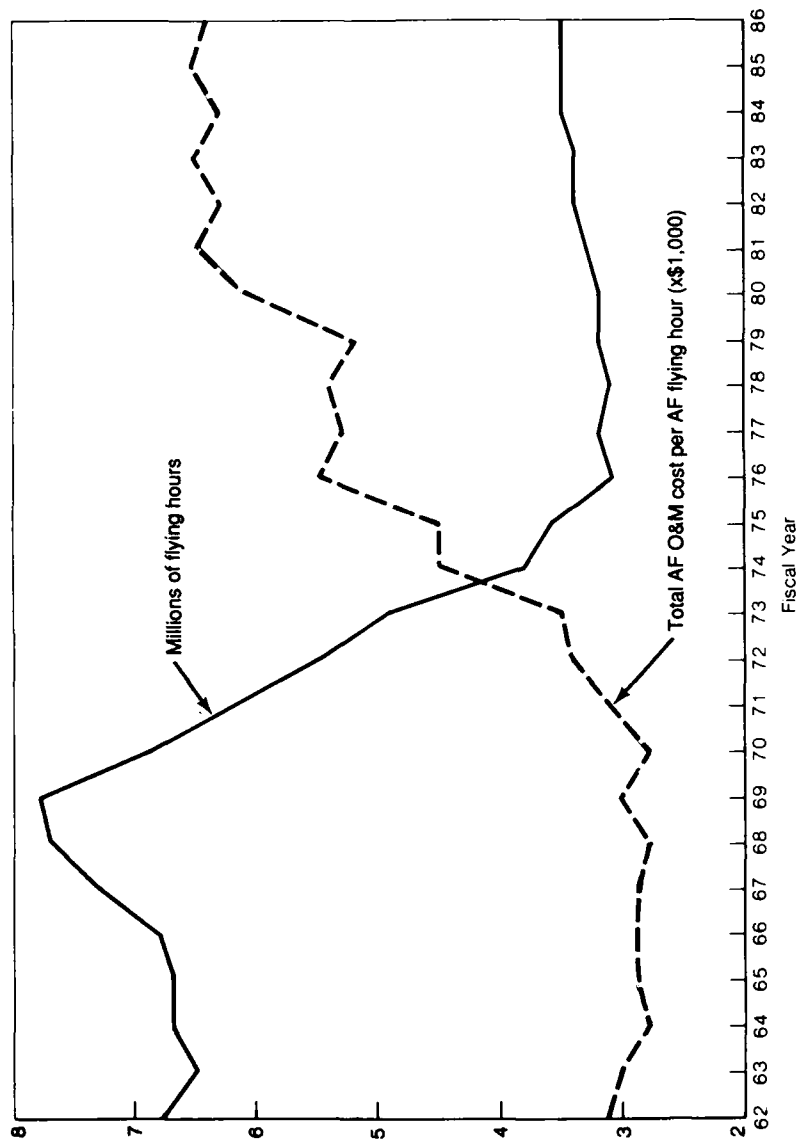


Fig. 16--Total USAF flying hours

can be called upon to augment active forces.⁹ Third, over time, "new" mission areas have opened up to the ARF. For instance, front-line aerial refueling resources (KC-135s) traditionally were operated solely by SAC active forces. However, today many KC-135s are assigned to reserve units.

The ARF has proved an excellent means for managing the steady growth of operational costs over time. There is no evidence that greater ARF utilization has incurred serious strategic or operational risks. Nor is there evidence that the ARF is not up to the standards of the active Air Force. Indeed, judging by their operational performance in competitions, inspections, etc., the ARF has frequently demonstrated that it is not second to the active Air Force in terms of mission effectiveness in many areas.

CUMULATIVE AIRCRAFT PROCUREMENT

Figure 18 chronicles cumulative Air Force aircraft procurement over the period FY52-FY86. The complexity of the data presented requires the use of certain conventions. First, the 35-year period under consideration is broken out into seven five-year periods. The number of aircraft of five different types bought during each period is given in stacked format (some categories have been combined when the figure has insufficient detail.¹⁰

For instance, during the interval FY52-56, 8,671 fighters, 1,787 bombers, 677 tankers, and 1,238 cargo aircraft were bought, a total of 12,373 airplanes.¹¹

The most interesting thing about Fig. 18, then, is an abrupt decline in airplane acquisition rates after the mid-1950s. The total number of planes purchased in the next five-year block falls to about 2,667, and then there is a generally downward pattern until the present time.

The series of horizontal arrows that appear along with the designation "Compared with" indicate the number of each type of aircraft (e.g., Ftr-Atk)—in stacked format—bought during the entire three decade period FY57-86. In other words, with some minor exceptions, *we bought more combat aircraft in the first five-year block shown here than in the entire 30-year period following it.*

⁹These include, for instance, MAC "associate crews" essential to the maintenance of adequate utilization rates.

¹⁰The types of aircraft are Fighter-Attack (Ftr-Atk); Bombers (Bs); aerial refuelers (KCs); and cargo aircraft of all types (Cs).

¹¹Excluded are trainers, helicopters, some special mission aircraft, etc. Also classified aircraft acquisition quantities do not appear here.

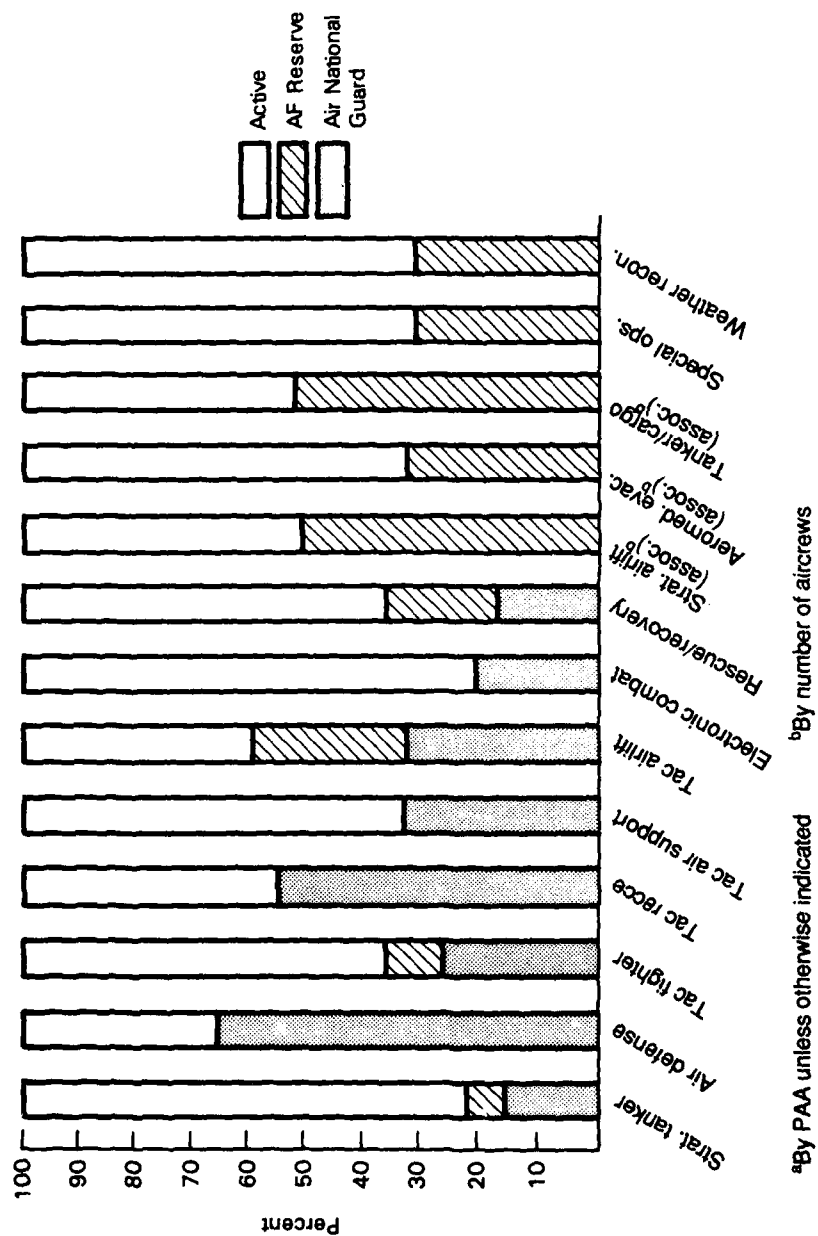


Fig. 17—Air reserve forces contribution to selected mission areas (1983)^a

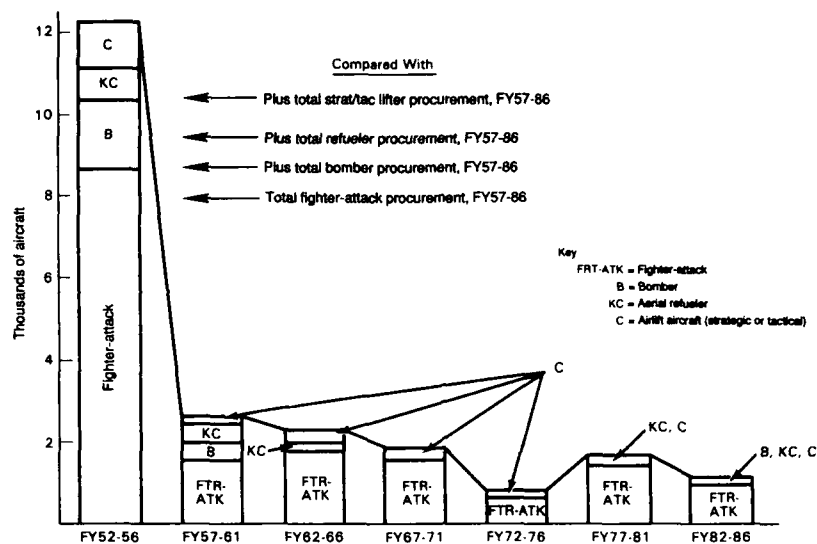
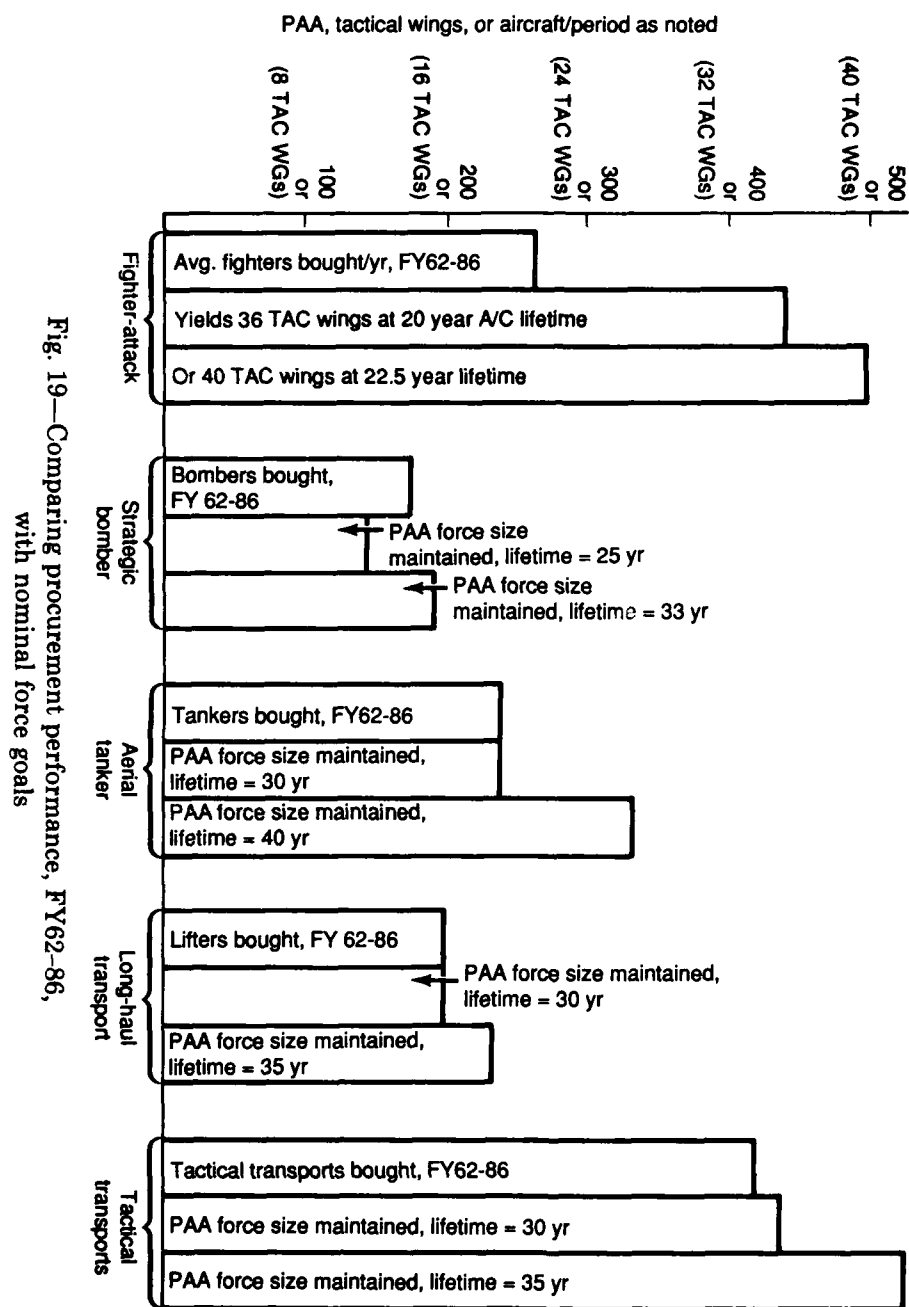


Fig. 18—Cumulative aircraft procurement
(FY52-86)

The factors behind these trends have been reviewed in detail elsewhere. Some of the more important ones include the effects of: (1) maturation and evolution of certain technologies that were not well understood immediately after World War II; (2) the design of aircraft with much longer service lives and much greater potential for upgrading (in lieu of new procurement); and (3) the steadily increasing unit costs of aircraft, aircrew, and flying hours.

COMPARING PROCUREMENT PERFORMANCE WITH NOMINAL FORCE GOALS

Figure 19 investigates the degree to which we have maintained our force structure size over time, or, put slightly differently, whether we have been able to replace aircraft that go out of the inventory on account of aging, accidents, etc. We consider acquisitions of five different types of aircraft (fighter-attack, bomber, tanker, strategic lifters, and tactical lifters). Because of the basic incomparability of procurement quantities for tactical fighters and aircraft of the other four categories, the vertical axis is given in two ways. For the latter four groups of aircraft, the number to be used is the absolute number of



airplanes. For fighter-attack aircraft, the index is in numbers of fighter-attack wing equivalents.¹²

For each of the five categories of aircraft, three vertical bars are given. The one on the left describes the total quantity of aircraft (or, in the case of fighter-attack planes, wing-equivalents) actually bought over the period FY62-86. For instance, between FY62 and 86, we bought some 50 equivalent-wings of fighter-attack aircraft (about 6,561 airplanes altogether), some 179 bombers, etc. The second (middle) bar shows the size of the steady-state force that this procurement rate makes possible, given: (1) the projected lifetime of an individual aircraft shown in the bar (all fighter planes last 20 years, all bombers remain 25 years, etc.); and (2) the assumption that procurement of airplanes over the past quarter century (the period FY62-86) is averaged out and therefore uniform over time.¹³ The third bar shows the same information as the second bar does, with an adjustment for longer force lifetimes.

This portrayal is useful in seeing whether forces are in a traditionally desirable state of "youth" or whether the forces' average age is growing. Suppose, to illustrate, that we desire a force of 36 tactical fighter wings, and that we wanted the average age of the aircraft in the force to be ten years. Then, assuming that the procurement buy over a long-enough period of time to be about equal in all years, we want to buy 1.8 wing-equivalents per year to maintain this force. Using standard overhead factors, we would need to buy some 1.8 wings/year \times (about 130 fighters/wing) or about 235 fighters per year to maintain 36 wings. Alternatively, if we desired a slightly larger force (40 wings) but were willing to tolerate slightly older airplanes (a lifetime of 22 years, on average), we would still need to buy 235 planes per year, on average, on a steady-state basis.

What this figure shows, then, is that over the period FY62-86:

- We bought only enough fighter-attack aircraft over the period FY62-86 to maintain (at a 20-year typical lifetime goal) about a 36-wing force.
- We bought slightly fewer bombers than needed to maintain a force of some 140 aircraft, provided we believe that bombers should not exceed 25 years in service; but if we can tolerate up

¹²A "TFW equivalent" being the 72 aircraft in the wing, plus overhead aircraft, or about 130 aircraft in total.

¹³Of course, many factors invalidate the second assumption routinely for instance, the vicissitudes of the defense budget, the economics and politics involved in proceeding at given rates with different kinds of airplanes, etc.

to 33-year-old aircraft, we purchased enough bombers to maintain a steady-state force of 190 airplanes.

- The same is true for aerial refuelers: If our force target was 240 aircraft, and our maximum tolerable lifetime was 30 years, then we bought just about enough airplanes. But with a 40-year lifetime, we have maintained more like a 330 airplane steady-state force.
- We have purchased insufficient numbers of strategic and tactical transports recently, measured in the same sorts of ways.

In other words, given traditional planning factors, the U.S. Air Force has not met its nominal inventory turnover and updating requirements. The obvious consequence of this is a requirement for changed thinking about aircraft lifetime (and such related matters as service life extension) and force end-strength.

AVERAGE AGE OF USAF INVENTORY

Figure 20 describes the average age of USAF aircraft in both active and reserve inventories. Procurement over the period FY62-86 was not

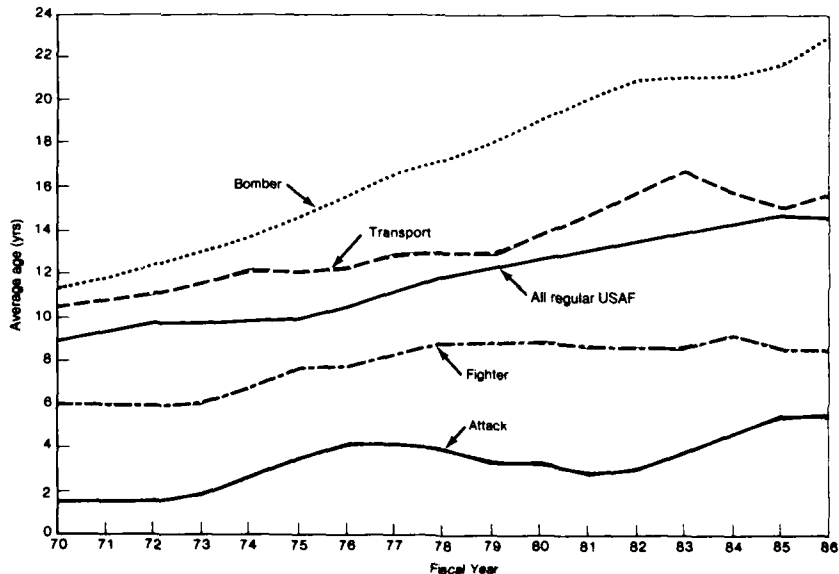


Fig. 20—Average age of USAF inventory

sufficient to meet force replacement objectives, given standards concerning the average age of forces. Consequently, if we put force size maintenance first in priority, insufficient buying explains the data in Fig. 20. In effect, what we are witnessing is a "greying" of the posture. We are holding the line only in the fighter and attack inventories, if that.

Attack aircraft had the lowest average age of all USAF aircraft over the period FY70-86. This average age was 3.3 years, and ranged from 1.5 years in the early 1970s to 5.5 years in FY86. The average age of fighter aircraft was 7.8 years, and the range was 5.9 (in FY72) to 9.2 (in FY84). The average age of cargo planes was 13.3 years over the past 17 years, and the range was from 10.4 years in FY70 to 16.8 years in FY83. And the average age of bombers was 17.1 years, ranging from 11.3 years in FY70 to 23 years in FY86. Finally, the average age of all regular USAF aircraft was 11.8 years over the 17-year period, ranging from 8.9 in FY70 to 14.7 in FY85.

In short, the force has most certainly been aging over time.¹⁴ Even the major surge in acquisition funding in the 1980s was not sufficient to reverse these effects materially, in large part because of an emphasis on high-end and special-purpose (including covert) aircraft programs.

TOTAL USAF AIRCRAFT INVENTORY

Not only is the average USAF airplane getting older, but procurement rates have not even been sufficient to maintain an aging force of constant size. We are maintaining an ever-older average force, and the total size of that force has been shrinking steadily over time. This is true for both combat and other aircraft. Figure 21 shows three "snapshots" of the total USAF inventory (this time including other than combat aircraft). Reserve element forces are broken out.

Over the two decade period considered, the USAF posture as a whole has contracted substantially. Specific components of the total force have also tended to contract with only one really important exception: The number of fighter-attack aircraft in both the active and reserve forces bucks the "shrinkage" trend seen at work between FY74 and FY84.

In combination, Figs. 19, 20, and 21 should be considered a warning of sorts for those who would seek to try to maintain the USAF at something like its present size, using present force planning factors (e.g., "a desirable fighter average age of 10 years"), at least given budgets and aircraft procurement costs not too unlike those of recent years. There are obviously great pressures on the posture as a whole. As a result, we must accept

¹⁴To some degree the "youth" of the USAF in the early 1970s is an artifact of the high acquisition rates associated with Vietnam, but buy quantities have nevertheless declined.

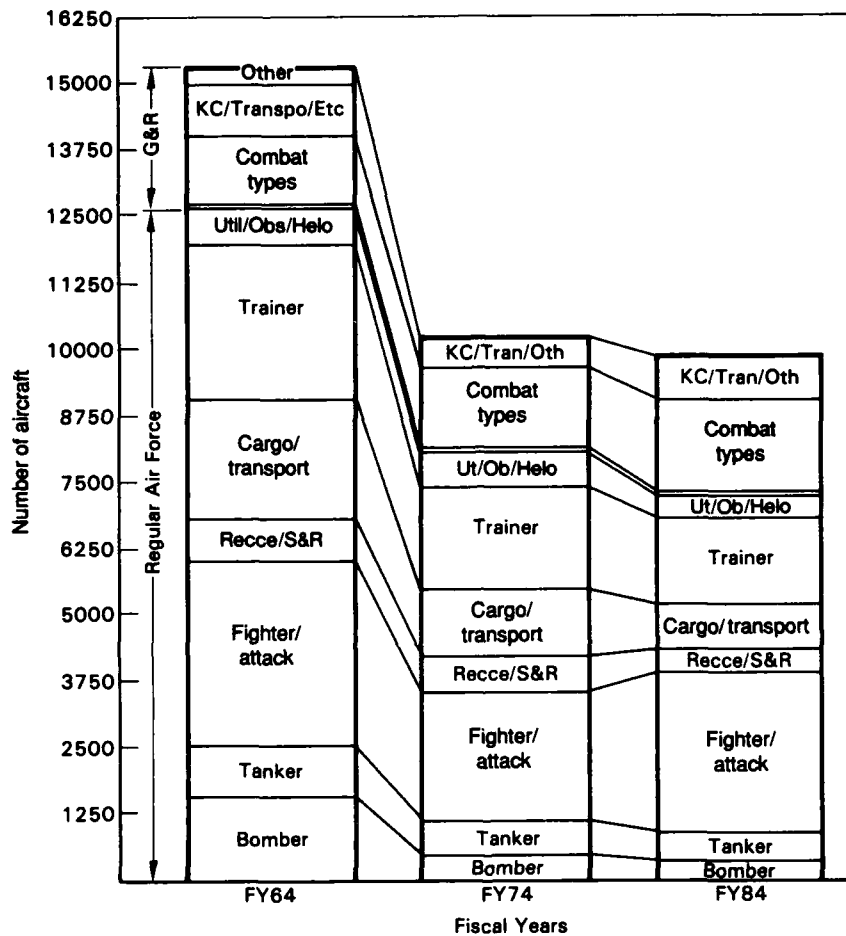


Fig. 21—Total USAF aircraft inventory: All types
(Selected years)

some combination of an older force, a smaller force, or a force composed of aircraft costing substantially less than they have. Or we must redefine our posture definitions and targets (such as by reducing overhead buys).

IV. TRENDS IN STRATEGIC FORCES

USAF PROGRAM I BREAKOUT OVER TIME

Figure 22 reconstructs the U.S. Air Force MFP I (Strategic Nuclear Forces) budget over time, with stacked appropriation titles. The figure is valley-shaped; in the beginning of this period, the early 1960s, while we are pursuing several modernization initiatives, we are also gradually phasing out forces associated with the general U.S. strategy of Massive Retaliation in favor of a defense concept based more on strategic flexibility and lower cost systems.

Simultaneously with this realignment comes a fundamental shift in the U.S. posture design, away from a force consisting almost entirely of bombers to one with substantial Air Force and Navy missile components. Hence, there is a fairly dramatic reduction in the operations-intensive costs of the early 1960s program that is partially offset, through about FY67, by procurement of mainly the Minuteman force. The decline of the U.S. strategic defense force also plays an important role in this portrayal.

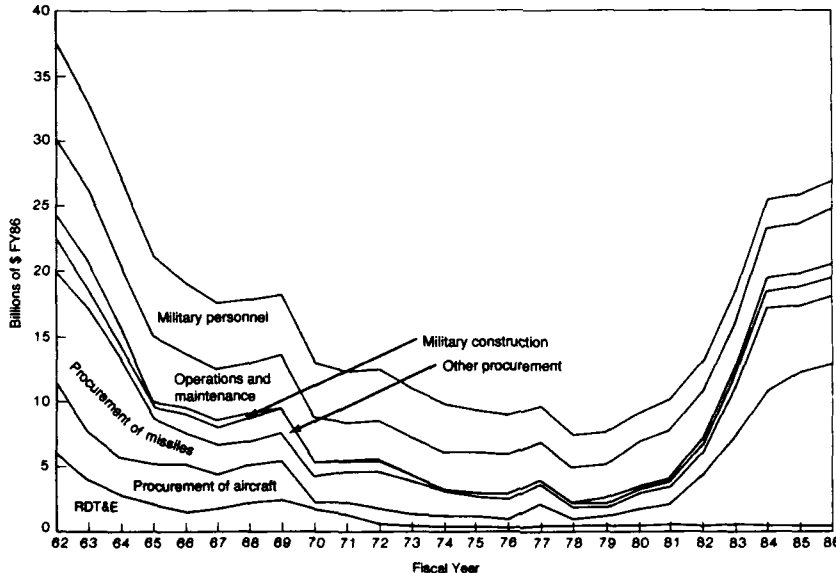


Fig. 22—USAF program I breakout over time

Through the 1970s, little is going on in the way of major force modernization. Procurement of fairly low-cost force multipliers (MIRV, SRAM) permits us to respond marginally to developments while avoiding acquisition of new platforms. Then, under the Reagan administration, there is an abrupt movement upward in the MFP I budget, a surge driven by an across-the-board modernization of the Triad. Driving this at first, of course, are the revived B-1B bomber and the MX. Other parts of the budget stay roughly constant compared with the experience of the preceding two decades. Also contributing to upward movement are the ALCM, KC-135R program, and many more. The B-2 and small ICBM programs are likely to place additional pressures on increasing the MFP I budget.

A brief tabular overview highlights these findings (Table 10). The distinct phasic nature of the USAF's strategic modernization initiatives (the Triad basically is renewed completely every quarter century). Note the low figure for RDT&E for FY82-86: It is impossible to interpret this data inasmuch as many of the new strategic programs were classified (moreover, some R&D would appear in MFP VI). Note also the trend over time toward reduced operational expenses. This trend may be influenced strongly by new delivery systems now in development.

Table 10

USAF MFP I BUDGET CONSTITUTION BY TITLE
(Billions of \$ FY86)

	Average Year, Group of Fiscal Years					
	62-66	67-71	72-76	77-81	82-86	62-86
Procurement	11.5	5.5	3.9	2.6	14.5	7.6
RDT&E	3.3	1.9	4.2	0.5	0.5	2.1
Other Investment	1.2	0.2	0.1	0.2	0.9	0.5
All Investment	16.0	7.6	8.2	3.3	15.9	10.2
MilPers	6.4	4.6	3.6	2.5	2.4	3.9
O&M	5.0	3.6	2.7	3.1	3.8	3.6
All Operations	11.4	8.2	6.3	5.6	6.2	7.5

USAF STRATEGIC OFFENSIVE FORCE STRUCTURE

Figure 23 looks back before the time interval considered primarily in this study to review the USAF strategic posture in the fifteen years after World War II. Noteworthy is the very steady growth of the posture from a level of about 200 bombers in the mid-40s to a total in excess of 2,000 heavy and medium bombers. From 1946 to 1952 the B-29 and a modified version of it, the B-50, constituted the largest part of the offensive delivery force. The number of B-29/50s in this force rose steadily to a peak of over 600 in 1952¹ but then declined abruptly, being phased out completely in 1955. The first true heavy bomber, the B-36, entered service in 1948. Through the 1950s, the majority of the

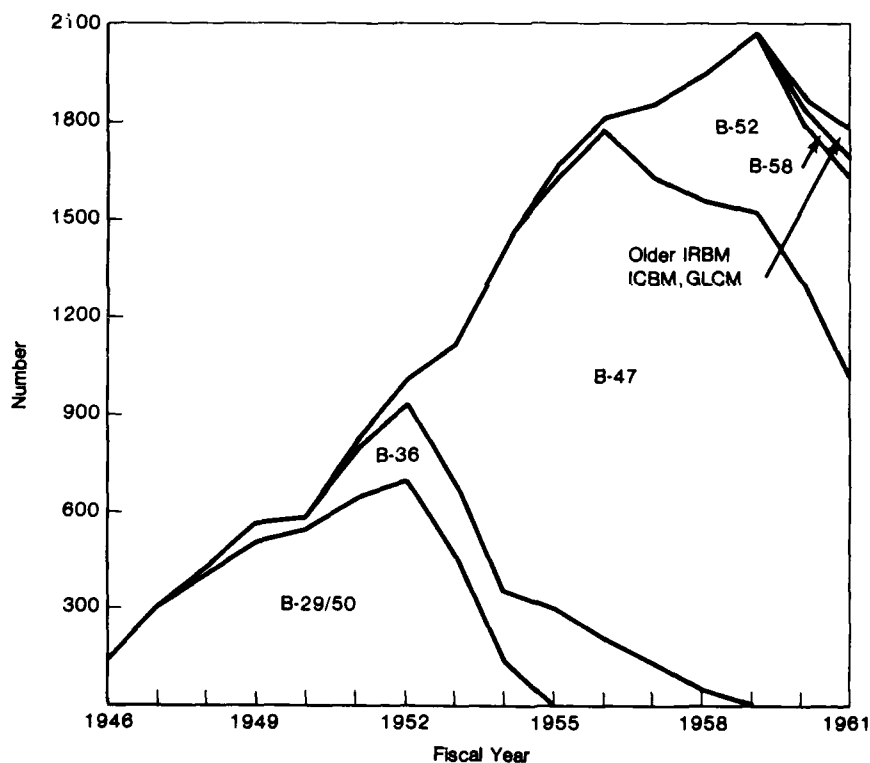


Fig. 23—Early USAF strategic offensive delivery systems

¹However, the total U.S. inventory of these aircraft, including those not in the primary SAC force structure, was larger.

SAC program subsequently consisted of the medium-range B-47. However, once the B-52 program began to gather speed, it was possible to consolidate and phase out other aircraft inventories fairly rapidly.

Also shown for historical interest are the small B-58 medium bomber (about 120 aircraft were bought overall) and a small wedge showing the modest contributions to the SAC arsenal made by a variety of early generation cruise and ballistic missiles (including 30 Snark intercontinental cruise missiles, some Thor IRBMs, and early Atlas ICBMs).

Figure 24 portrays the USAF strategic offensive force in the most recent quarter century, carrying on where Fig. 23 left off. By 1961, strategic, threat, budgetary, and financial developments had led to the general conclusion, responded to vigorously by McNamara, that a follow-on posture to the large bomber force of the 1950s should stress ballistic missiles in hardened launchers. Accordingly several ongoing USAF strategic programs were cut or reduced then.² Minuteman missiles were to replace the B-47 force on about a one-for-one basis, but lead times and delayed phase-out of B-47s (because of the crisis over Berlin and Cuba) led to a modest dip in overall USAF Strategic Nuclear Delivery Vehicles (SNDVs) in the period 1961-67. Older B-52s also were retired. McNamara early on ordered a cap, first of 1,200, then of 1,000, on the ultimate size of the Minuteman force fielded.

The ICBM force was steadily upgraded during the late 1960s and early 1970s. The Minuteman III MIRV program marginally increased USAF strategic charges levels; so too did the nominal fractionation of the bomber fleet, mainly with smaller gravity weapons and the Short Range Attack Missile (SRAM), but also for a while with the Hound Dog Air Launched Cruise Missile (ALCM). Also, beginning in 1970, the FB-111A medium bomber came into the force to replace the troublesome B-58 one-for-one.

NOMINAL U.S. STRATEGIC WEAPONS INVENTORY

Figure 25 provides a stacked portrayal of the total nominal U.S. nuclear delivery inventory over the period FY62-86. Not necessarily all weapons would be on alert at any given time, nor could they even

²Including the B-70, Thor IRBM, Snark program, liquid fueled Titans, the B-58, the Skybolt ALBM, and more. Indeed, the last B-52H was delivered in October 1962 at the height of the Cuban missile crisis. The Minuteman program (as well as Polaris) was given redoubled priority, with silo-basing endorsed (rather than more expensive arrangements such as train or aerial basing).

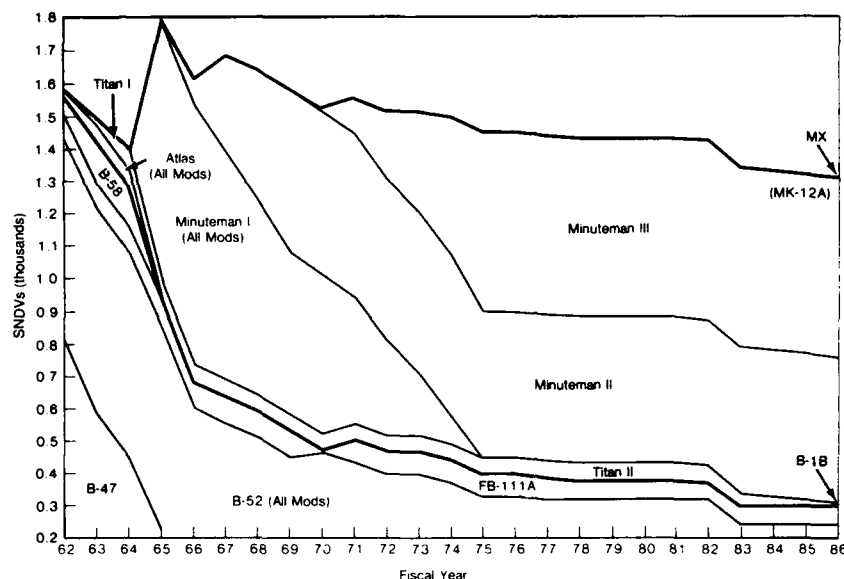


Fig. 24—USAF strategic force structure

necessarily be generated (for instance, these numbers would include forces off line for overhaul, etc.). “Nominal” is meant here as a description of the operational potential of the U.S. arsenal: Shown is the number of weapons that U.S. delivery vehicles could in principle carry if every possible system were operational and alert at the same time.

From 1962, nominal bomber-carried weapons decline to a 25-year low of 1,864 in 1972. After 1972 bomber weapons increased to 2,390 in 1978, on account of SRAM, and then to 3,694 in 1986, as a result of the ALCM program. Bomber weapons ranged from 95 percent of the strategic weapons inventory in 1962 to a low of 25 percent in the late 1970s.

ICBM weapons increased from 75 in 1962 to 1,054 in 1967. This held constant until 1970 when the multiple independent reentry vehicle (MIRV) program yielded a nominal arsenal by 1975 of 2,154 reentry vehicles (RVs). This force remained constant until after 1981, when Titan II attrition and retirements, and then MX deployments, influenced the top-line. From 1962 to 1965 ICBMs made up less than 10 percent of the

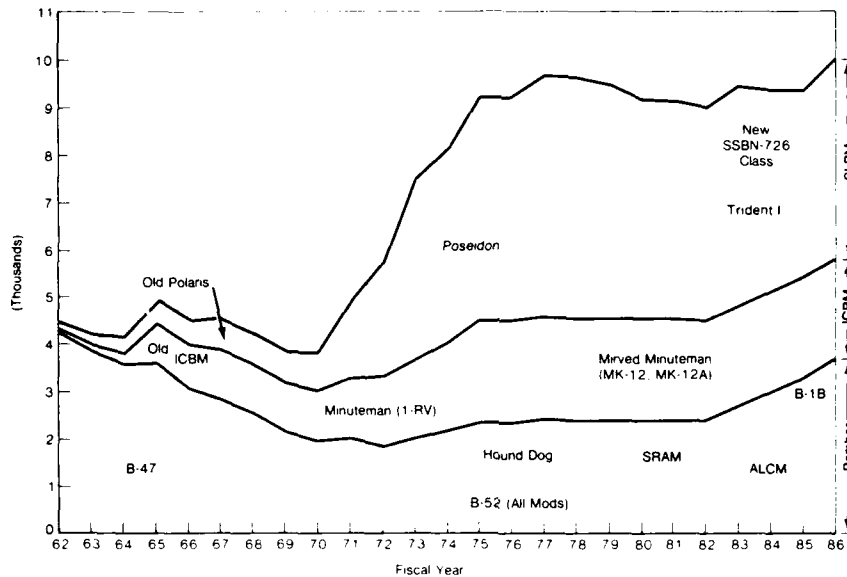


Fig. 25—Nominal U.S. strategic weapons inventory

strategic weapons inventory. From 1966 on ICBMs varied between 21 percent and 28 percent of the total.

In contrast, Navy submarine launched ballistic missile (SLBM) weapon totals grew from 144 in 1962 to 656 in 1967. After 1969 this force increased dramatically to 5,120 by 1977 again on account of MIRV. From 1978 to 1985 SLBMs decreased almost every year (except 1983) to 3,968 in 1985 as the older Polaris boats were retired. In 1986 the figure rises to 4,192 as Trident submarine deployments offset such retirements. From 1962 to 1964 SLBMs made up less than 10 percent of the strategic weapon inventory. Between 1973 and 1982 they made up 50 percent, or more.

Composition of Triad by Element

One measure of interest used to describe strategic offensive forces is the number of warheads carried by different elements of the strategic posture over time. Figure 26 shows, in proportional terms, the relative emphasis on different types of delivery vehicles over the period FY62-86. We see, for instance, how we moved from a virtually all-

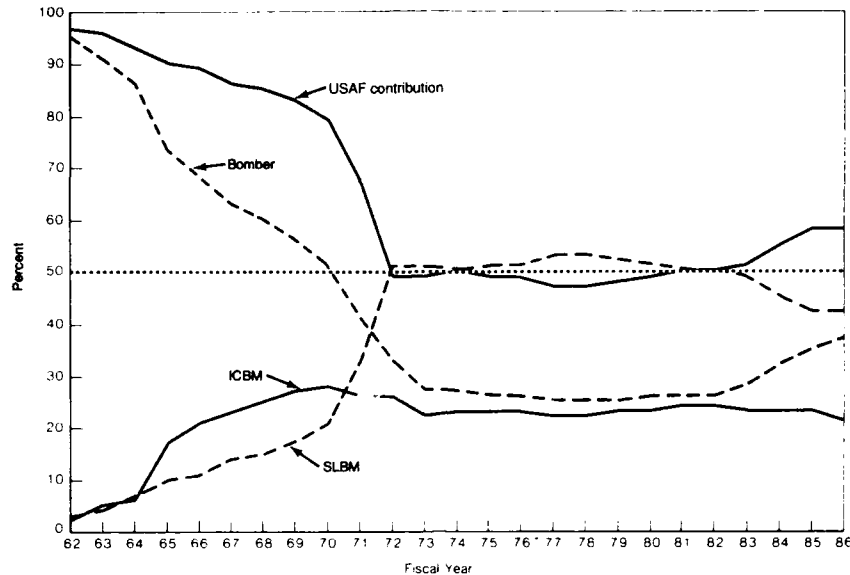


Fig. 26—Composition of triad by element

bomber strategic offensive posture in the early 1960s to a modern posture, consolidated about FY73, in which bombers would account for some 30 percent of all possible weapons. At that point, ICBMs hold steady at some 25 percent of total theoretical U.S. nuclear delivery capability.

Note, then, the dramatic rise in the contribution to the total strategic offensive weapons inventory contributed by SLBMs, chiefly the Poseidon program. In about FY73, the sea-based leg of the deterrent force carried about 50 percent of the strategic arsenal, with both USAF posture components carrying the other half. Only in the last few years, with another form of force fractionation (the equipping of the bomber force with ALCMs) do we see the relative share contributed by the SSBNs decline.³ On average over this period SLBMs represented about 35 percent of the warheads in the Triad, ranging from 3 percent in FY62 to 53 percent in FY77-78.

³This is also caused by a decline in the number of SSBNs and by the rearming of some old and new FBM boats with Trident I missiles, each carrying a nominal 8 compared with 10 for Poseidon, warheads.

NOTIONAL SAC AVAILABLE INVENTORY TREND

Figure 27 considers in more detail the net USAF strategic offensive delivery capability. First of all we show the total USAF strategic nuclear delivery potential (the "nominal weapon inventory statistic appearing in Fig. 26 above). It shows that between FY62 and 86, the total nominal weapon loading on ICBMs and bombers ranged from a low of about 3,000 in FY70 to a high of almost 6,000 in FY86. Beginning at about 4,315 weapons in FY62, the figure declines to 3,040 in FY70. Subsequently, the effects of MIRV, SRAM, and ALCM are evident. From FY75-82 the total inventory held steady, varying between 4,518 and 4,568; after FY82, the arsenal grew to 5,923 in 1986.

Of course, not all weapons are normally on alert and ready to go. This figure thus shows the effects of qualifying our nominal data to reflect some basic scenario information. First, under the nominal total line is the deduction in the total nominal force that would be experienced if we do not include in the total those ICBMs that were off line for major maintenance at the time of an alert, along with that fraction of the bomber weapons force that could not be kept on a fully generated status. Below this line appears an adjustment for the losses we

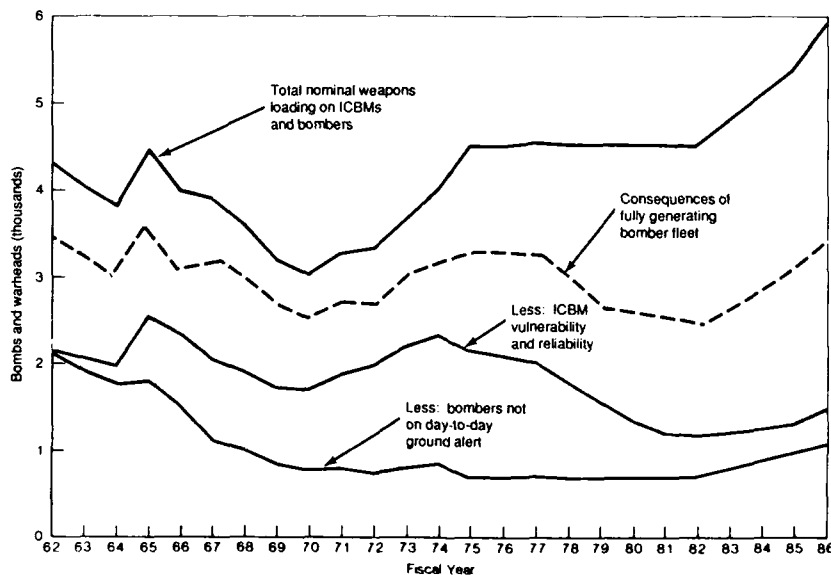


Fig. 27—Notional SAC available weapon inventory trend

could expect in the ICBM force inventory if the United States absorbs a Soviet first strike without launching under attack.⁴ Finally, we show on the bottom line how many nominal weapons would be available if we not only absorb such a counterforce attack, but do so during an ungenerated day-to-day alert status as well (one in which only those bombers routinely on alert could be expected to survive a sneak attack). These adjusted lines show, for the varying "scenarios," how many of the nominal weapons force we might expect to be able to launch under the circumstances indicated (weapons penetrating through to and exploding over their intended targets would be fewer yet).

These scenarios and data are somewhat arbitrary, but in these curves for instance, can be seen the growing vulnerability of U.S. ICBMs in the past ten years. Despite reductions in the day to day alert readiness of U.S. bombers, we can maintain a fairly constant alert force in an emergency and routine conditions alike, because of force fractionation. For some time, we have had about 1,000 reliable, launchable weapons; and with full generation and no preemption, we could count on something between 3,000-3,500 weapons over this entire period.

THE BUDGET AND POSTURE "DENSITY" OF USAF STRATEGIC FORCES

Figure 28 depicts the budget and posture "density" of USAF strategic forces. First, the solid line depicts the total USAF strategic forces budget (MFP I) for each fiscal year, divided by the number of nominal weapons carried by the total force in that year. It is therefore a crude estimate of how much the USAF "pays" to keep strategic weapons available over time. The trend, in terms of spending per weapon, is generally downward over the period; occasional upward movements (e.g., around 1970 and the early 1980s) are associated with specific development program surges.

The dashed line shows how many nominal weapons are, on average, carried by each available delivery vehicle. Again, the specific systems involved vary greatly (from single-weapon ICBMs to very highly fractionated ALCM-carrying B-52s). But there is a slight upward tendency over time toward more weapons for each delivery vehicle.

Following are important current policy implications for the movement in both of these overall trend lines. Current programming

⁴For a description of these scenarios, see Lewis, 1982.

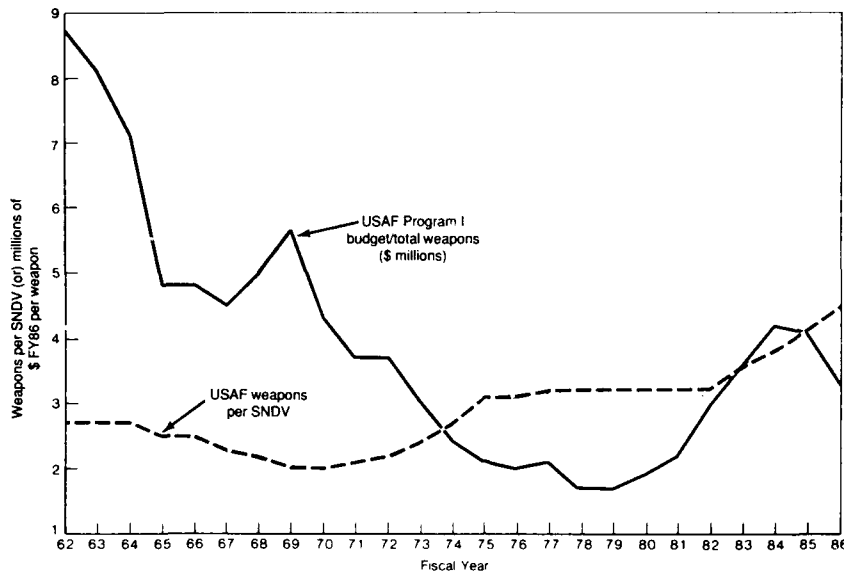


Fig. 28—The budget and posture “density” of USAF strategic forces

options could to some degree work against the general trends suggested here. For instance, the deployment of a single-RV ICBM in a mobile configuration would tend to both pull down the weapons-per-SNDV curve and push up the annual cost-per-weapon curve. This could be partially offset by other developments, but it is important to keep such tradeoffs and trends in mind.

STRATEGIC OFFENSIVE OPERATIONS PER NOMINAL WEAPON

Figure 29 presents overall data on the costs of *operating* certain elements of the U.S. strategic offensive nuclear posture over time. Estimated USAF and Navy strategic offensive operating expenses are divided by the number of nominal weapons maintained in each year.⁵ The data appearing here give a feel for which service more “efficiently” places

⁵“Nominal” as defined above: The nominal measure may well overstate the number of weapons actually on hand at any point in the fiscal year concerned.

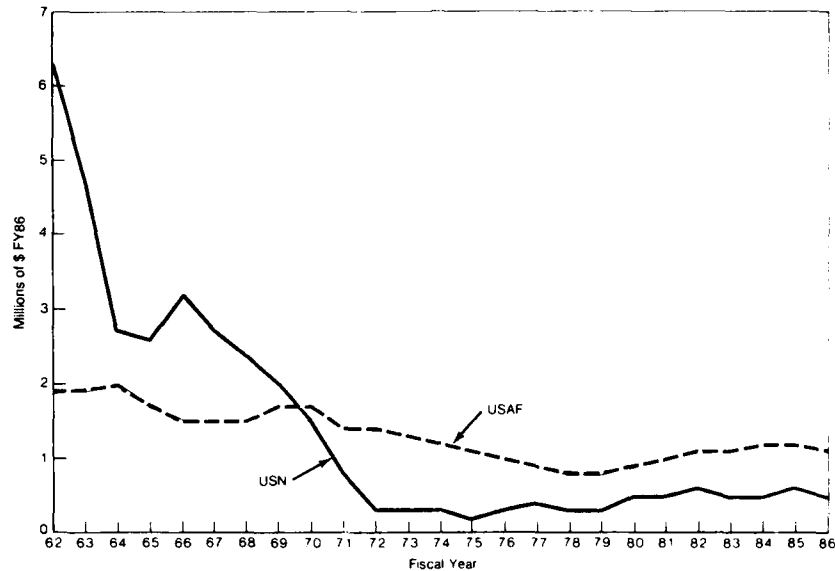


Fig. 29—Strategic offensive operations per nominal weapon

weapons on line without any consideration given to the effectiveness or missions concerned.⁶

Thus, solid-fueled, silo-emplaced ICBMs have historically been a bargain: Day-to-day operating costs are low, yet alert rates are high. Maintaining bombers in the Triad involves fairly high operating costs, regardless of our day-to-day alert rate; we must put considerable money into training, maintenance, a large base structure, etc.⁷

In contrast, given our current operational concept, Navy SSBNs, like bombers, cost a fairly constant amount to maintain regardless of alert

⁶However, these statistics do leave much to be desired. For one thing, they do not reflect alert rates, nor do they say anything useful about the costs we pay into a "surge hedge." Also, some crucial advantages of maintaining a Triad are obscured by this format.

⁷In fact, the Strategic Air Command currently maintains a bomber day-to-day alert rate of 30 percent compared with a rate of 40 percent between FY67 and FY74, and a rate of 50 percent before FY67. Reductions in peacetime alert rate were made possible in FY67 by the availability of Minuteman, and after FY74 by the arrival of MIRVed Minuteman IIIs. Note, then, that the USAF operations tab here reflects a combination of operationally costly bombers and quite cheap Minuteman ICBMs.

status;⁸ but these solid-fueled missiles lend themselves to a high continuous per-warhead alert rate (about 55 percent for Polaris/Poseidon; and as much as 70 percent for the longer ranged Trident, which comes within range of targets earlier in an SSBN's typical deployment). In sum, the operational advantages attendant upon low-maintenance solid-fueled missiles lead to lower operational rates for these forces than for bomber weapons. But in an emergency, many additional bomber weapons can be put on alert.

In the 1990s, different phenomena may emerge, notably for the USAF. On the one hand, the B-1B is engineered specifically with day-to-day operational efficiency in mind, as is the Peacekeeper (MX) ICBM. Similarly, ALCM and, presumably, the Advanced Cruise Missile (ACM) allow us to get many more weapons out of each bomber operations dollar. On the other hand, the operational costs of the small ICBM could be much greater than those of previous missiles on a per-RV deliverable basis. Little can be said now about the B-2 Advanced Technology Bomber, but there is no particular reason to assume it will be any less costly to operate than its predecessors. In short, close monitoring of the per-weapon USAF operations tab should attend decisions on future Triad elements.

THE DECLINE OF THE STRATEGIC DEFENSE MISSION

The decline of the homeland air defense mission is a well-known feature of the historical period described. Most representative of the steadily decreasing priority assigned to strategic defense forces is the size of the active and guard manned interceptor complement. This sharp decline is hardly surprising in view of the strategic defenses' low budget priority. As displayed in Fig. 30, interceptor forces fade from a maximum strength of almost 1,800 aircraft (half of them active) in the early 1960s to a total of about 1,200 in FY69 (less than half of them active), after which the force declines abruptly to a figure of 200-400 aircraft, about equally split between active and reserve forces. Exactly the same decline could be shown in the case of nearly every other type of strategic defensive force element—SAMs (including the Air Force Bomarc⁹ A and B, of which a maximum of some 250 missiles were fielded), radars, control centers, etc.

Congress has not been generous lately with funding for strategic air defenses, even in the wake of the president's October 1981 speech

⁸E.g., a nuclear-powered submarine has to be crewed even when it is not deployed.

⁹Bomarc was, in effect, a long-range, unmanned interceptor aircraft.

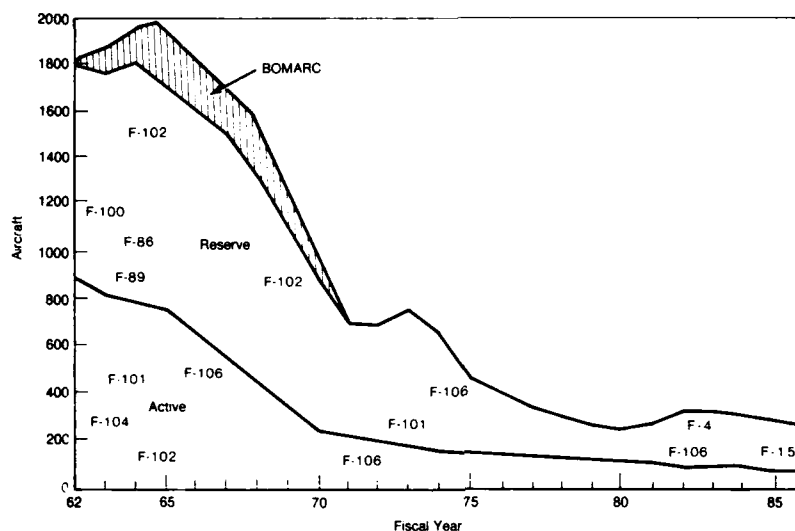


Fig. 30—Total USAF strategic defense interceptor force

calling for more robust air defenses and, more tellingly, in the aftermath of the March 1983 call for SDI. For instance, no extra airborne warning and control system (AWACS) to supplement a marginal (seven out of 34 built) complement operationally assigned to ADCOM were procured, and fighter modernization has proved difficult as well. Thus, dedicated interceptor force structure over the past few years has tended to run to about 13 to 15 squadrons, only about four of them active, plus various augmentation option forces.

SHARE OF USAF BUDGET GOING FOR STRATEGIC DEFENSE

Figure 31 also shows that strategic air defense spending has declined as an absolute share of USAF expenditures. And, again in common with the defensive effort overall, USAF investment in continental air defense has historically been rather low. Only about 3–4 percent of the USAF budget has recently gone for strategic air defense, and any future increment must, it would seem, come on top of this slice.

The relative renaissance of strategic air defenses as measured by budget share from FY77 through FY87 and, even more so, FY83 through FY85 deserves special discussion. These historical periods

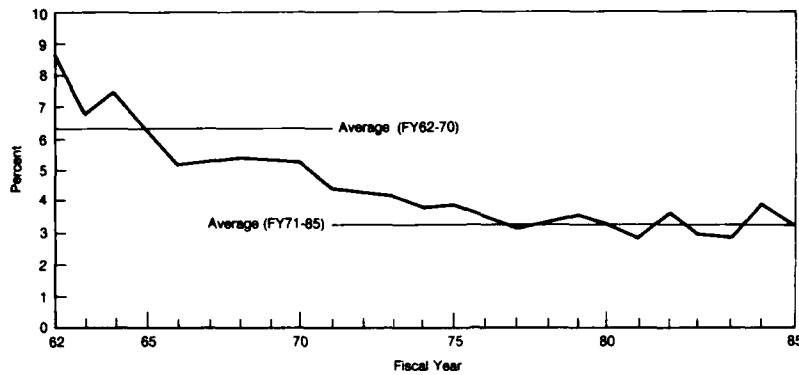


Fig. 31—Share of USAF budget going for strategic defense

mark, first of all, a greater emphasis by the Carter administration on warning and assessment capabilities, and second, priority placed first on air defense and then on the Strategic Defense Initiative ordered by the Reagan administration. Spending on strategic defenses became such a high priority that the Reagan administration emphasized it in spite of budget control and deficit reduction pressures.

V. GENERAL PURPOSE FORCES TRENDS

USAF PROGRAM II BREAKOUT OVER TIME

Figure 32 divides up the USAF MFP II budget into its constituent appropriations titles over the period FY62-86. The bottom half of the stacked graph consists of the investment related titles, these being (in the order in which they appear), RDT&E, procurement (of aircraft, missiles, and other systems), and military construction. Then come the operational titles, operations and maintenance, and military personnel.

As a whole, USAF general purpose force spending tracks predictably with important historical developments. First, the MFP II category as a whole increases from a low of \$13 billion in the early 1960s to figures in the mid \$20s of billions in the mid and late 1960s. This increase is associated with both the requirements of Vietnam and also the change in strategy away from deterrence by nuclear force toward a policy of flexible response.

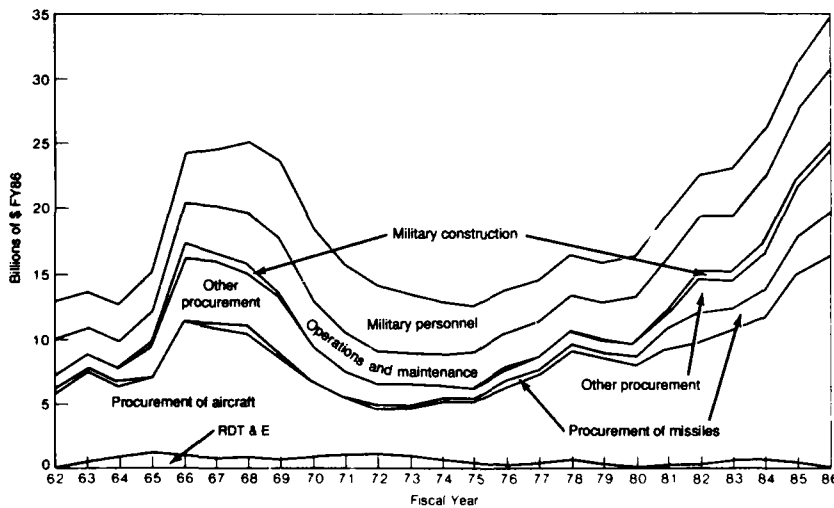


Fig. 32—USAF program II breakout over time

Subsequently, this program, post-Vietnam, declines to a nadir of about \$12.4 billion in FY75. Then, the USAF MFP II budget as a whole begins to rise, as the rehabilitation of the U.S. general purpose forces becomes a top priority. During the post-1980 period, the USAF MFP II top-line figure grows by a staggering 70 percent, from \$15 billion in FY80 to some \$26 billion in FY85.

Since the operational accounts stay more or less constant in absolute terms, procurement surges explain the movement in the USAF MFP II top-line. One way of interpreting this disparity is that the USAF general purpose forces account has a fairly constant appetite for personnel, flying hours, etc., which cannot be removed by technical or strategic innovation (as has sometimes been the case with nuclear forces).

Table 11 summarizes the data for this figure. As with the USAF budget as a whole, procurement is highly volatile. In contrast, operations are much less so, which is somewhat surprising given such developments as the Vietnam War and the period of hollowization following the Vietnam drawdown. That suggests that raiding operational accounts is probably a very poor way of raising money should budget cuts require that. At least within MFP II, RDT&E is quite low. Again, recently, these figures could be skewed somewhat by the existence of classified programs.

Table 11

USAF MFP II BUDGET CONSTITUTION BY TITLE
(Billions of \$ FY86)

	Average Year, Group of Fiscal Years					
	62-66	67-71	72-76	77-81	82-86	62-86
Procurement	9.0	11.2	5.9	9.5	18.8	10.9
RDT&E	0.8	0.9	0.7	0.5	0.5	0.7
Other Investment	0.4	0.4	0.2	0.2	0.7	0.4
All Investment	10.2	12.5	6.8	10.2	20.0	12.0
MilPers	3.0	5.2	4.0	3.1	3.5	3.8
O&M	2.5	3.7	2.5	3.2	4.9	3.4
All Operations	5.5	8.9	6.5	6.3	8.4	7.2

DISTRIBUTION OF ACTIVE TAF MISSIONS OVER TIME

Figure 33 shows the mix over time of the USAF tactical air force when it has come to an evolving set of primary missions. The readjustments are noteworthy, and the existence of a "swing category" of forces able to alternate missions on short notice underscores the inherent flexibility of the TAF posture as a whole. The modification of in-inventory aircraft to introduce more and more varied combat capability into forces is not fully discussed here; it is too complex an issue for the present portrayal, but it must nonetheless be borne in mind.

Figure 33 suggests the existence of three discrete eras of prevailing mission mix. The following division is somewhat arbitrary in that there are no obvious benchmarks whereupon "new concepts" for force mix were abruptly adopted.

- Dating from the late 1950s, the TAF was configured for a nuclear contingency. By the early 1960s, plans envisioned a

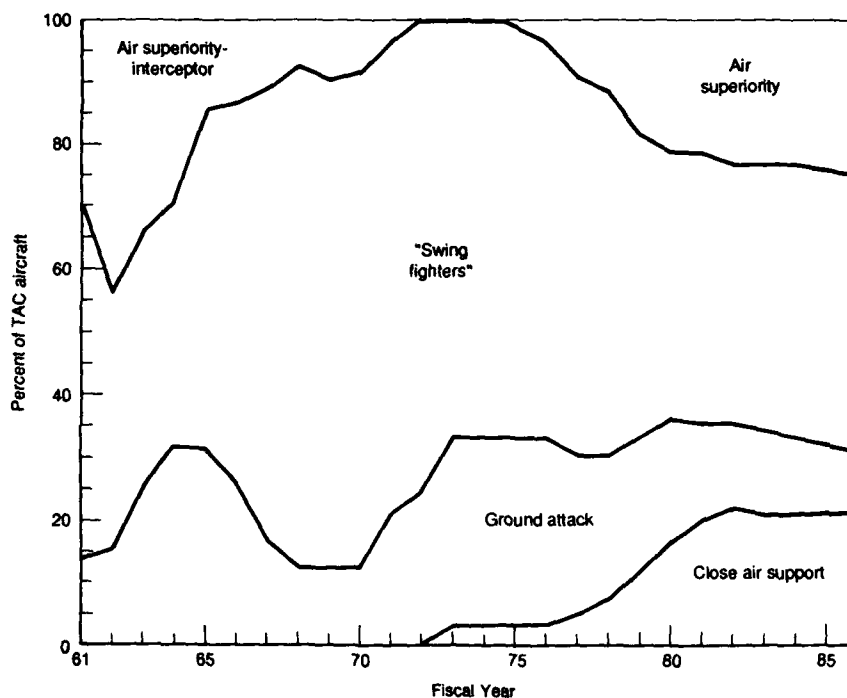


Fig. 33—Distribution of active TAF missions over time

late 1960s TAF with over 60 percent of active force structure consisting of the F-105 (originally a tactical nuclear bomber), and plans for 1973 forecast a force half composed of F-105s and the successor to that aircraft, the F-111. As it was, the introduction of flexible response, the loss of many F-105s in Vietnam, and the early termination of the F-111 program combined to redirect these plans.

- A transitional phase occurred in the early 1970s. After adopting the Navy's F-4, hard upon the heels of Vietnam air combat experience, and confronting an improved Soviet threat and a revived NATO requirement, USAF tactical needs shifted substantially.
- Finally, there was the implementation of a posture plan including the USAF concepts inaugurated around 1970, but also reflecting centralized DoD concern with multi-role requirements, the growing costs of acquiring high end aircraft, and the need to attend to some missions more vigorously (e.g., CAS).

REGIONAL DEPLOYMENT OF USAF ACTIVE TACTICAL FIGHTER UNITS

It is useful to consider the regional disposition of USAF fighter-attack forces over time. Such a general overview portrayal as the one in Fig. 34 can be thought of as a generalized indication of evolving relative U.S. regional strategic priorities.

As a general rule, about 40-50 percent of the USAF tactical fighter force normally is deployed at home. With the exception of those in connection with the Vietnam War, some 30-40 percent of the force ordinarily is deployed in support of NATO. Incidentally, this proportion has tended to grow slightly over time, reflecting U.S. actions in support of the flexible response strategy. The balance of the Air Force has been deployed either in the Pacific theater (Korea, Philippines, and, during the war, elsewhere in Southeast Asia), or in other locales.

COMPOSITION OF USAF TACTICAL AIR FORCE BY SQUADRON EQUIVALENT

Figure 35 shows three things. First is the number of squadron-equivalents constituting the total tactical fighter force. We see that the tactical force has been growing steadily over this entire period from about 90 TFS-equivalents (30 TFW-equivalents) in FY62, up to almost 115 TFS-equivalents (shy of the 40 TFW-equivalent goal) by FY86.

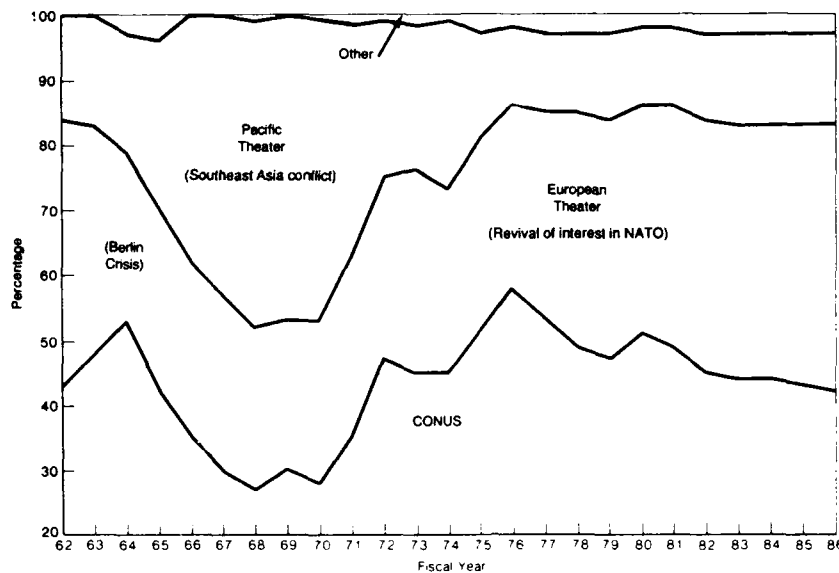


Fig. 34—Regional deployment of USAF active tactical fighter units (by squadron)

Second, note the relative contribution to the entire force by Guard and Reserve forces. Squadrons above the dashed line are G&R forces, as indicated. In general, we see that the gradual growth trend in the tactical fighter force over time primarily is a result of expansion of the ARF.

Third, consider the number of squadron-equivalents assigned to given missions. Both the active and reserve force structure are to a modest degree tending to become more specialized over time. What accounts primarily for this specialization is the addition of mission-dedicated CAS aircraft (first the A-7 then the A-10) to both active and reserve inventories and the acquisition of the F-15 A/C air superiority fighter.

The importance of the multi-role component of both active and reserve postures merits special mention. Barring a major reconfiguration in mission mix or posture design, a majority of USAF fighter-attack forces will be medium-cost F-4/F-16 "swing" types of aircraft. From these designs, moreover, come a substantial number of special mission (e.g., defense suppression, strategic interceptor, and recce) aircraft.

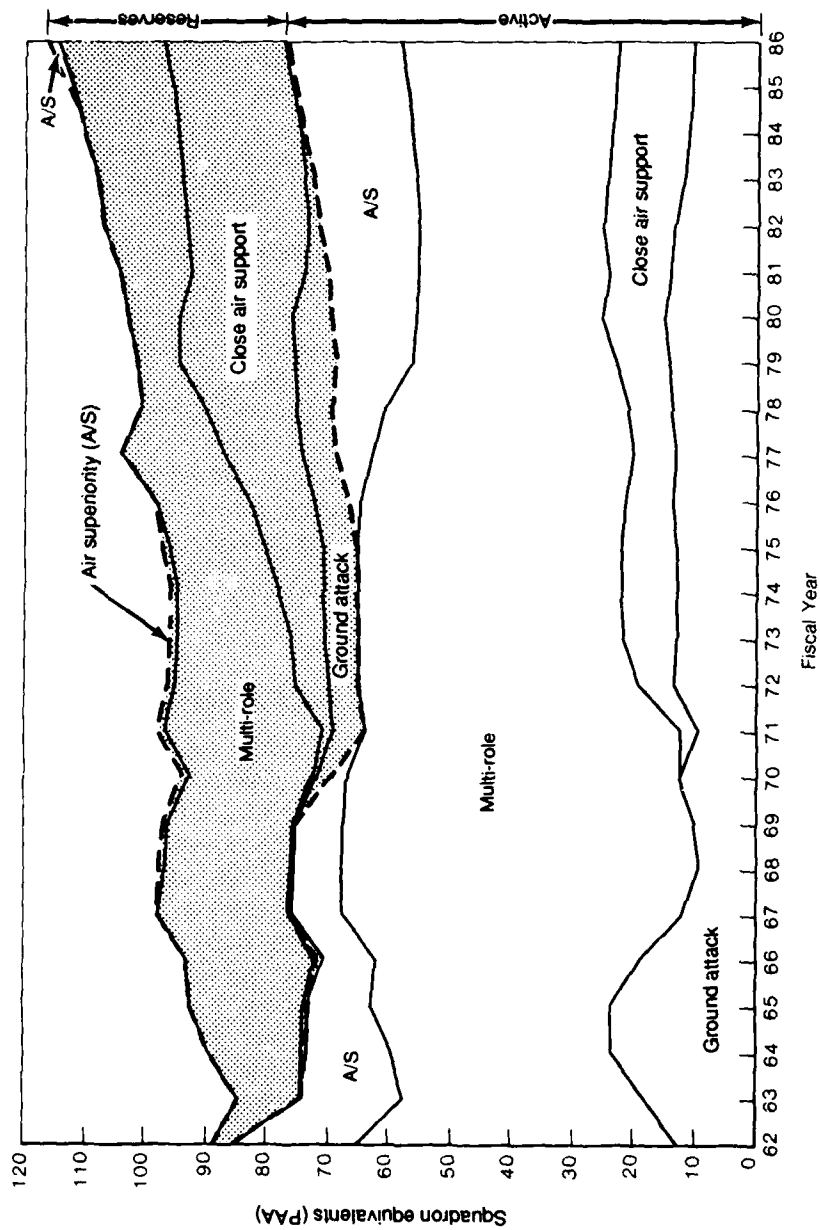


Fig. 35—Composition of USAF tactical air force by squadron equivalent

USAF TAF COMPOSITION

Figure 36 is a summary compilation of certain TAF posture statistics. On the left margin appears total force size, defined in TFW equivalents. Plotted over the period FY62-86 is the size of the active force structure, and stacked over it, the active force structure plus the Guard and Reserve. The vertical line at the 40 TFW level was the one-time TAF objective which, it should be noted, was recently abandoned for fiscal reasons. The new objective has been reported to be 35 TFW.

On the right margin is a scale showing how much of the total force structure is to be found in the Guard and Reserve forces. Data appear in the dashed line that runs across the chart. At the beginning of the period, not much of the posture is in the reserves, but this figure rises to about 25 percent by about 1970. After 1975, there is a further rise in this index to the point where the G&R constitutes fully one-third of all USAF TFW.

From FY62-86, active force strength ranged from 28 wings in FY62 to 21.5 in FY75. Active plus Guard and Reserve strength ranged from 30 wings in FY62 to 37 in FY86. The percentage of the force in Guard and Reserves has ranged from 5 percent in 1962 to 33 percent from 1984 on.

USAF FIGHTER-ATTACK AIRCRAFT PROCUREMENT

A question of enormous interest to planners concerns USAF fighter-attack aircraft procurement over time. Figure 37 shows, in stacked format, the number of planes bought in each fiscal year over the FY62-86 period. Note both developments with respect to the absolute top-line (numbers of planes purchased of all types), and to the mix of specific planes bought. Early aircraft buys emphasized airplane types more in line with the design concepts and strategy of the late 1950s; that is, plans stressed long-range nuclear capable interdiction aircraft (the F-105 and then the F-111). However, the requirements for both the Flexible Response strategy and for the Vietnam War led to the acquisition of the Navy-designed multi-mission F-4 aircraft and the A-37 and (also Navy-designed) A-7 ground attack airplanes. Subsequently, a new generation of fighter planes, reflecting strategic imperatives, the advantages of specialization, new technology, lessons learned from the Vietnam War, and the economics of modern weapons procurement (and the need for a so-called high-low force mix) gave rise to the F-15/F-16/A-10 generation of fighter/attack aircraft.

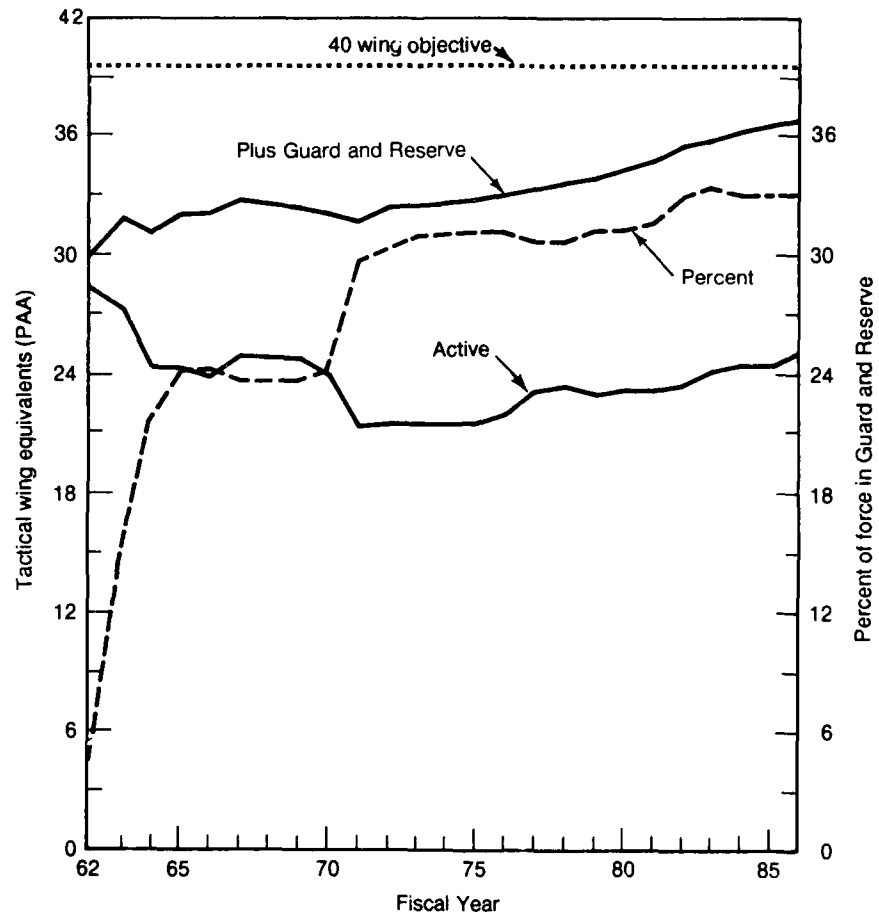


Fig. 36—USAF TAF composition

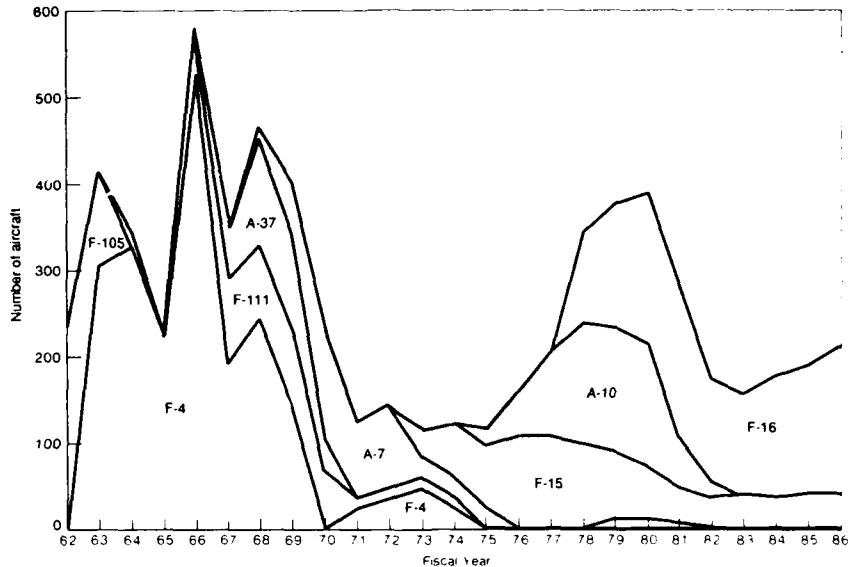


Fig. 37—USAF fighter-attack aircraft procurement

If we take the data presented in Fig. 37, we can see the size force that USAF aircraft acquisition plans should make possible, over the long haul. In Fig. 38, standard overhead factors are used to compute two data for each fiscal year shown: the number of aircraft we must buy to maintain a 40 TFW goal (once we are there), and the number we must buy to maintain the size of the fighter force that actually is in hand in that particular fiscal year. Superimposed on these two bits of information are actual procurement rates.

Only during two intervals (the first associated with Vietnam, and the second occurring in the late 1970s and early 1980s), were we buying enough airplanes to maintain either then-current posture, never mind a 40 TFW force.¹ Aircraft buys during the Reagan buildup years are less than those required for a 40 TFW standard, or even, for that matter, the "current posture" standard. The reason for this is that although we have been spending a great deal of money on tactical air forces, we purchased fewer but more expensive aircraft. This compares with the late-1970s "boom" in which we bought greater quantities of low cost airplanes, especially A-10s. From FY62-86, the number of aircraft

¹That is, the buys—except briefly during Vietnam—were not sufficient for building up to and then maintaining the 40 TFW target.

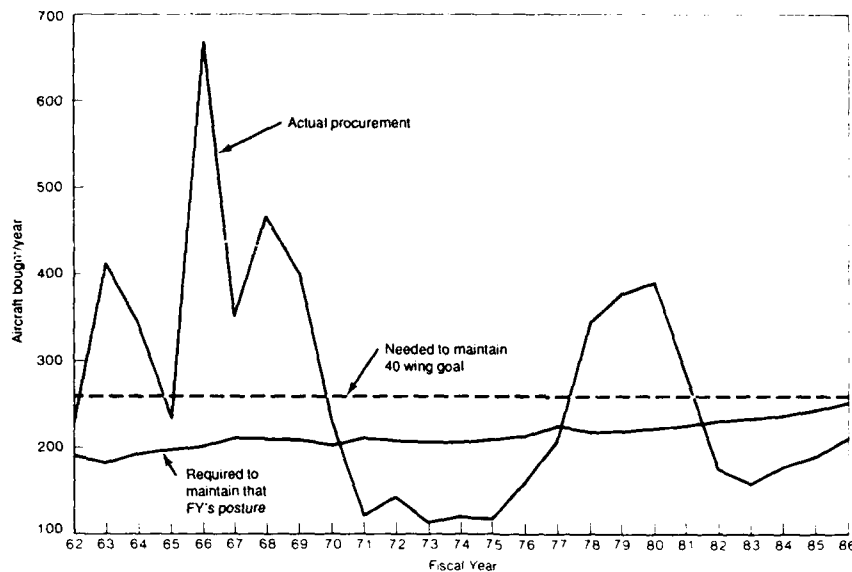


Fig. 38—Alternative USAF TAF procurement rates compared

required to maintain “that fiscal year’s posture” ranged from 184 (in FY63) to 252 (in FY86). Actual procurement varied greatly over the 25 years. Average procurement stands at 266 fighters per year. That being the case, the recent move to a TAF force goal in the mid-30 TFW range seems more in line with historical realities.

USAF TACTICAL AIRCRAFT OVER NINE YEARS OLD

Naturally, the procurement of fewer and fewer aircraft per year—in the absence of any decision to cut back force goals, accept an older aircraft mix, or adopt other modest steps to maintain inventory (e.g., conduct less training or reconfigure training to minimize accidental losses)—requires some posture compromises. The USAF has over time generally followed a sensible hybrid solution, one dimension of which has stressed the modification of existing inventory aircraft to function in a more demanding environment or in a more efficient way.² Figure

²Some examples include reconfiguration of the B-52 mission profile for low-altitude penetration, armament of the B-52 with standoff weaponry; improvements in avionics and countermeasures for all kinds of aircraft; stretching and addition of air refueling

39 illustrates another point: the degree to which U.S. aircraft are, by design or otherwise, remaining in inventory longer.

From FY64-86, USAF aircraft over nine years old ranged from 34 percent in FY64 to 77 percent from FY79-81. The sharpest increase in inventory share was in FY65 when that percentage increased by 13 percent. The period from FY76-78 was also one of sharp increases; during that time increases ranged from 5-7 percent.

TRENDS IN OPERATIONAL COSTS FOR MFP II

Figure 40 provides a crude index of certain trends in operational costs for the tactical elements of the USAF over time. Four lines are shown. Of these, three measure cost ratios per squadron (in \$M), and the fourth counts personnel per squadron in thousands of men (it is tracked on the right vertical axis). The three first lines: (1) divide the

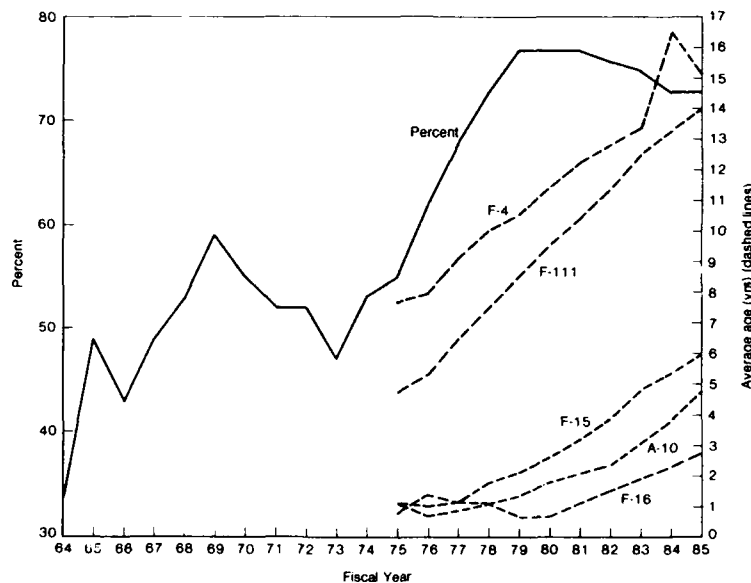


Fig. 39—Percent, USAF tactical aircraft over nine years old (and aging of selected inventory types)

capability to the C-141A; development of various navigation, targeting, and other pods to improve capabilities of combat aircraft (for instance, the LANTIRN pod for the F-16); use of the basic F-15 air superiority fighter design to yield the F-15E interdiction aircraft; and many more.

MFP II O&M budget by the number of active squadrons, (2) divide the Military Personnel element of MFP II by the number of squadrons, and (3) divide the entire MFP II budget by the number of squadrons. In all three cases, there is a substantial growth in the cost (defined in these ways) of running squadrons during the Vietnam War years. After the early 1970s, these costs drop; but after the mid-1970s, they begin to move back upward again, because of energy price increases, technological pressures, more training, and other factors.

Precisely the same story is told in the personnel per squadron account. Under wartime circumstances, or when cost factors require it, when budgets permit it, we spend more dollars or people per squadron.³ Taking into account the greater emphasis on nuclear deterrence in the early 1960s and the lead times involved in acquiring a credible conventional warfare air force, however, the importance of the slightly higher unit operating costs of the tactical air force in the late 1970s compared with the early 1960s seems to be attenuated.

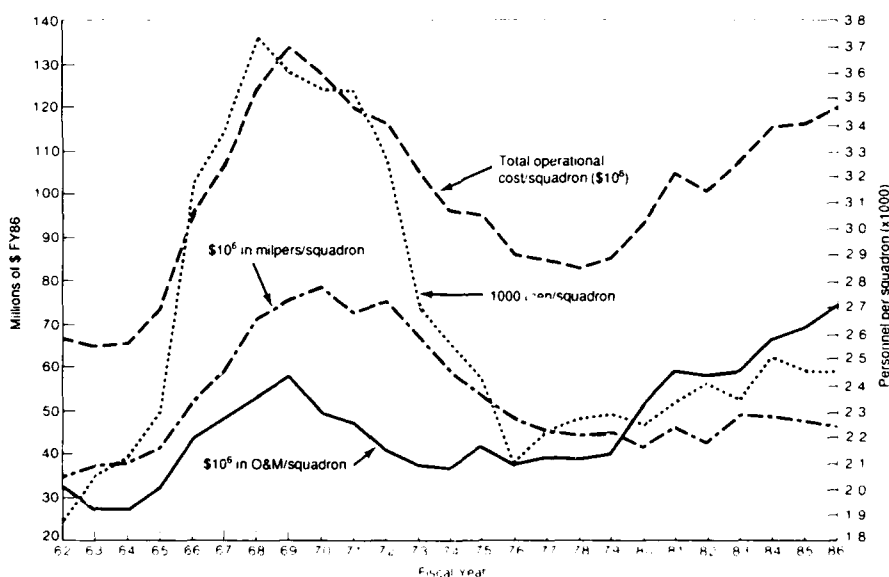


Fig. 40—Trends in operational costs for MFP II

³Of course, other things are going on in MFP II than the acquisition and operation of fighter attack squadrons. These influences are not reflected in this portrayal, but they are minor compared with the costs of fighter-attack forces.

There is no apparent systematic real growth in the operating costs of the tactical air forces on a unit-force structure basis, at least over the period shown. This fact—plus that of the Vietnam-related bulge—suggests that operational expenses are more under our control than some other kinds of spending. This is not necessarily a good thing: Neglect of readiness may be one explanation for the relative stability in operating costs. Depending on the readiness standards to be applied in the future and on the costs of competing activities (especially procurement), we should not be surprised by some degree of continuation of this general pattern.

VI. TRENDS IN DEPLOYABILITY FORCES AND POSTURE

STRATEGIC AIRLIFT PROFILE

Figure 41 shows the rise of U.S. strategic airlift force strength. There are two distinct sections to this history. The first, lasting through the 1960s, features the continued service and then the retirement of those airlifters carrying over from the 1950s. These older lifters were generally "strategic" in range only, one might say. Subsequently is the development, procurement, and then modification of an admittedly scaled-back fleet of strategic airlifters, the C-141 and C-5 (277 of the former and 77 of the latter were procured).

By 1979, with various troublesome developments in the Middle East and Persian Gulf reaching a boiling point, interest in enhancing conventional deterrence in those regions suddenly seemed essential: the Carter and Reagan administrations ordered the expansion of strategic mobility capabilities. Procurement of 60 KC-10As began, and the Reagan administration decided early on to procure some 50 improved C-5B outsize-capable airlifters. More important, design of the new C-17 aircraft began. Despite the austere basing environment to be encountered in Southwest Asia, the C-17 would be able to carry outsize cargoes over "strategic" distances. Unlike the C-5, however, it would be able to transport such critical war equipment directly into remote airfields that previously could be serviced only by "tactical" airlifters.

STRATEGIC AIRLIFT PROFILE (ACTIVE VS. RESERVE COMPONENTS)

Figure 42 recasts the data appearing in Fig. 41 to show the emphasis placed at various times on the active and reserve components of the strategic airlift force. Given the similarity of large, long-haul civilian airliners and freighters and strategic airlifters, the emphasis on reserve support where applicable is not surprising. Reserve contributions in the 1960s extended to the operation of reserve lift units. But with a smaller fleet in the 1970s, the reserves have also provided "associate crews"—pilots, load crew personnel, etc.—to active formations (fully utilized, a single airlifter would require more than a single crew per plane). Just in the last couple of years, moreover, elements of the core of the strategic airlifter force are being transferred fully to G&R units.

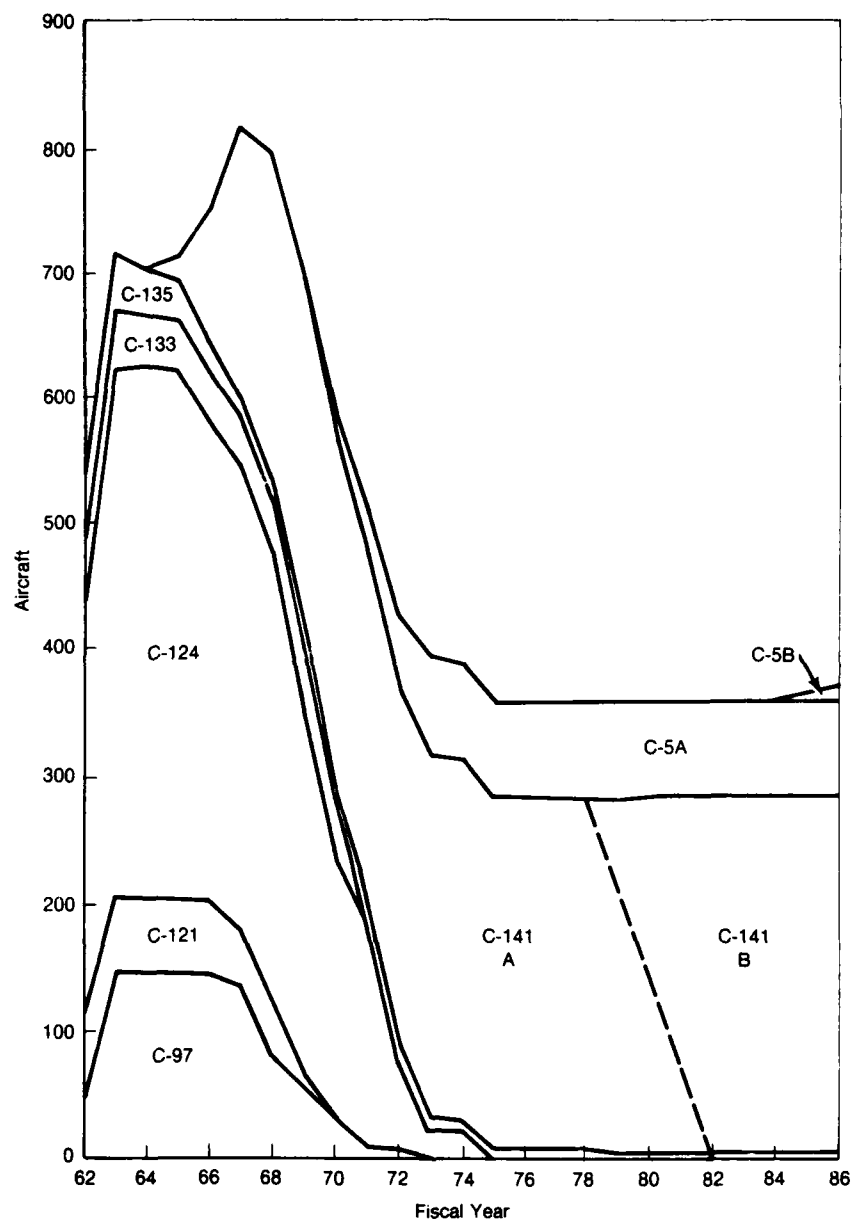


Fig. 41—Strategic airlift profile
(Active and reserve)

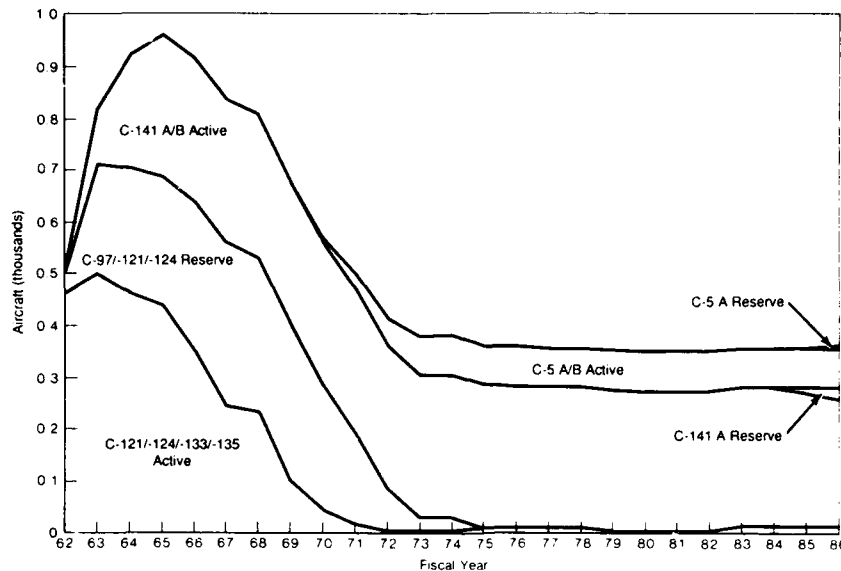


Fig. 42—Strategic airlift profile
(Active vs. reserve components)

For the first time, front line jet strategic airlifters are assigned to the reserve forces; C-141 assignment began in FY85, and the C-5 began arriving in the reserves a year later.

TOTAL MTMD CAPACITY: USAF STRATEGIC AIRLIFTER FLEET

Figure 43 shows both the total estimated airlift fleet capacity on hand (in both guard and reserve elements) measured in MTMD, and also the nominal MTMD capacity per individual aircraft over that quarter century period. Figure 43 shows that overall fleet lift capacity¹ has increased substantially, growing from less than 15 MTMD in the

¹MTMD, "millions of ton-miles (of lift) per day," it should be noted, is computed in terms of a specific scenario: It is arbitrarily taken to be the movement of a modern mechanized infantry division from the northeast United States to Europe. If a straightlegged infantry division were being moved, the contribution of the older lifters might increase proportionately. If an armored division, or a division to a more remote destination, were being lifted, the more modern aircraft would have to be more heavily weighted.

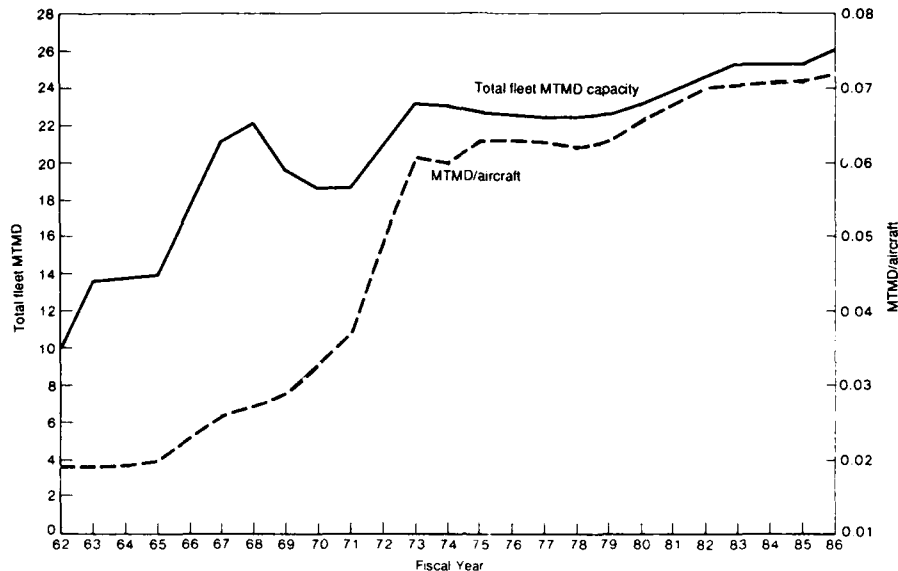


Fig. 43—Total MTMD capacity: USAF strategic airlifter fleet

early-1960s, to about 21 MTMD in FY72, on up to 25 MTMD by FY82, to a little over 26 MTMD today.

In addition, the MTMD per aircraft statistic has gone up over time. According to data scaled along the right-hand axis, the average airplane in the mid-1960s accounted for only 0.020 MTMD, with this figure growing to 0.050 in FY72, to 0.066 in FY80, and finally on up to about 0.072 today.²

CRAF PROGRAM PARTICIPATION AND CAPABILITY

The Civil Reserve Air Fleet, or CRAF, has played a not inconsiderable role in the total arsenal of U.S. Air Force strategic airlift capabilities; Fig. 44 is a stacked portrayal of CRAF participation under a Stage Three callup. The number of CRAF cargo aircraft has gone from a level of about 150 aircraft plus or minus a couple of dozen in the period FY62-76, down to a level of 110-120 in the end of the 1970s and

²Other indices paralleling these might be shown, but they are hard to describe simply. Sustaining airlift operations over a continuing period depends very much on the amount of spending that has gone into supplies, spares, and the like.

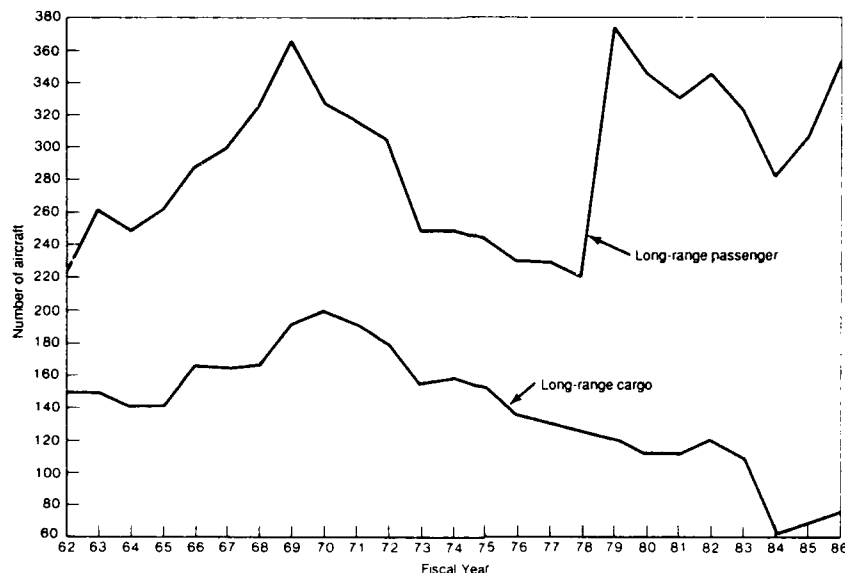


Fig. 44—CRAF program participation

finally down to only 60–80 airplanes in recent years. The reasons for this decline are related to airline participation difficulties, among other things. Stacked on top of the cargo contribution are shown the number of passenger aircraft available.

Figure 45 tries to quantify the contribution of the fleet of aircraft described in Fig. 44. As we can see, from 1975 on, the CRAF capability for *passengers* has been substantial. The last year that the last of the prop aircraft in the strategic lift force were phased out was 1975. Inasmuch as many of those may have had a primary passenger carrying role, it is evident that DoD has decided to rely to some extent on CRAF, not MAC, for passenger movement in a mobilization scenario.

The cargo contribution to the CRAF program tells a rather different story, however. We see a rise in capability from FY62–67. The same technologies that made possible large jet powered military strategic airlifters were being used in civilian aircraft, and so a lot of latent and residual capability existed in the civil air fleet. Capabilities declined during the 1970s: This did not so much indicate a withdrawal of assets from CRAF as it did reduced needs after Vietnam mobilization had ended. After then, and with the return of interest in conventional

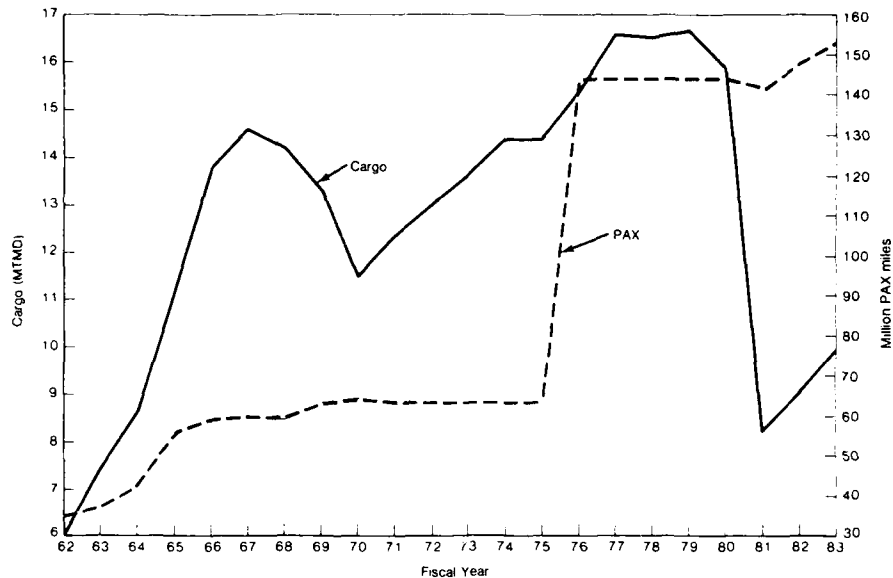


Fig. 45—CRAF intercontinental capability
(Stage III callup)

capabilities, CRAF capabilities generally grew. But by the early 1980s, we find a decline in cargo participation in CRAF, largely because of increased fuel costs and difficulties between DoD and the airlines (which came under increasingly economic constraints with higher fuel costs, deregulation, and the like). Consequently, CRAF cargo capability plunged to around 8 MTMD, from which the program has only recently begun to recover.

TACTICAL AIRLIFT PROFILE

Tactical lift capabilities are also currently very important to world-wide airland force operations. In major, mid-level, and low intensity contingencies alike, the ability to rapidly redeploy and resupply theater forces would be essential to operational success. Currently for tactical airlift there is a capability goal, analogous to that developed by the Congressionally Mandated Mobility Study (CMMS) for strategic airlift (of 13,500 tons per day). Currently, about half of that goal is met, and the C-17 would satisfy it, if fully acquired and fully used for the theater lift role. The mainstay of the posture today, of course, is the C-130

series of aircraft: in the late-1970s, plans for a jet powered follow-on to the C-130 were canceled, in lieu of C-130 modernization.

Figure 46 portrays the tactical airlift force structure over time by type of aircraft. From FY62-70, the C-119 (reserve) fleet declined from 692 to 48. The C-47/C-118 (active) force also declined to 9 in 1974 from 124 in 1962. Such airplanes were largely replaced by the C-130: Active C-130 strength grew from 240 in FY62 to 535 by FY65. Similarly, from FY68-86, reserve C-130 strength increased from eight in FY68 to 292 from FY83 on. Augmenting C-130s in the reserves were C-123s and C-7s, whose size grew from a handful in FY66 to 132 after FY76.

Figure 47 shows that the reserves have been more heavily involved than their strategic counterparts in the tactical airlift business over the years; the reasons for this are fairly obvious.

On the left axis is the total number of tactical airlift aircraft in the USAF inventory. This increases from approximately 1,100 at first to about 1,300 by FY65; then it falls to about 500 or so aircraft in FY72, fluctuating thereafter between 550 and 650 aircraft altogether. The active component of this complement grows from less than 400 airplanes up to about 750 or so at the height of the Vietnam war, falling again with demobilization back into the 250 aircraft range.

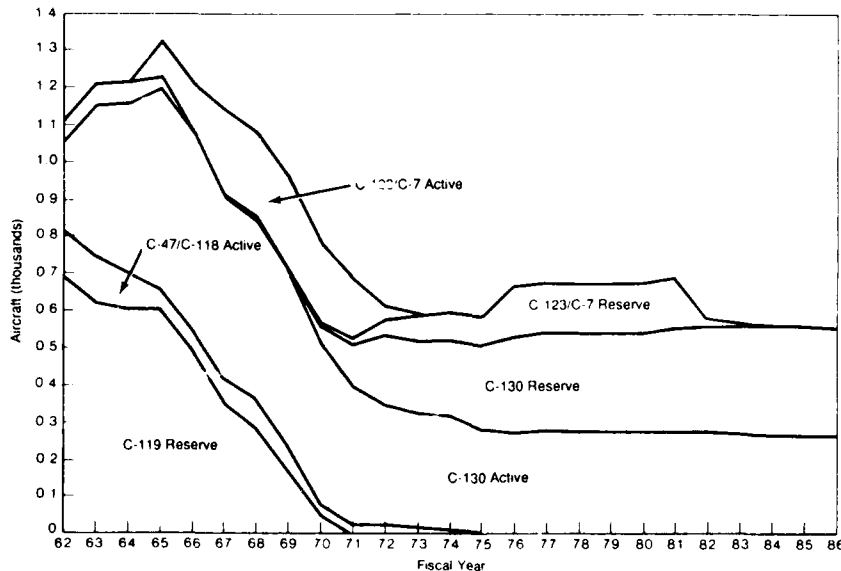


Fig. 46—Tactical airlift profile

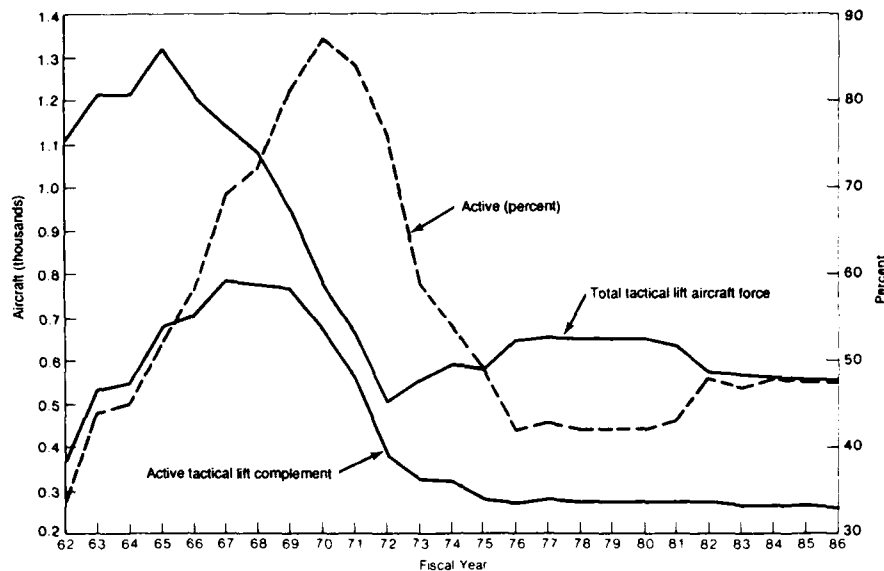


Fig. 47—Tactical lift: Active vs. reserves contribution

The right axis shows the percent of the force that is on active status. Again we see a Vietnam-related hump, followed by a decade in which some 40–50 percent of the tactical airlift force comes to remain active units. Tactical airlift is clearly a mission in which the talents of reservists can be exploited well; based on these charts, the Air Force has done just that.

LONG-RANGE AERIAL REFUELING FORCE STRUCTURE

The historical USAF air refueling posture is shown in the usual stacked format in Fig. 48. Although a variety of other total air refueling systems were designed or acquired,³ the primary strategic refueler

³The KC-97 was a version of the B-29 aircraft modified for air-to-air refueling. These aircraft were intended and operated as buddy tankers for a range-constrained B-47 medium range bomber force; although they performed well in other contexts, they did not, all things considered, represent such a major contribution to USAF refueling potential across the boards over the past quarter century that they need to be considered in detail here.

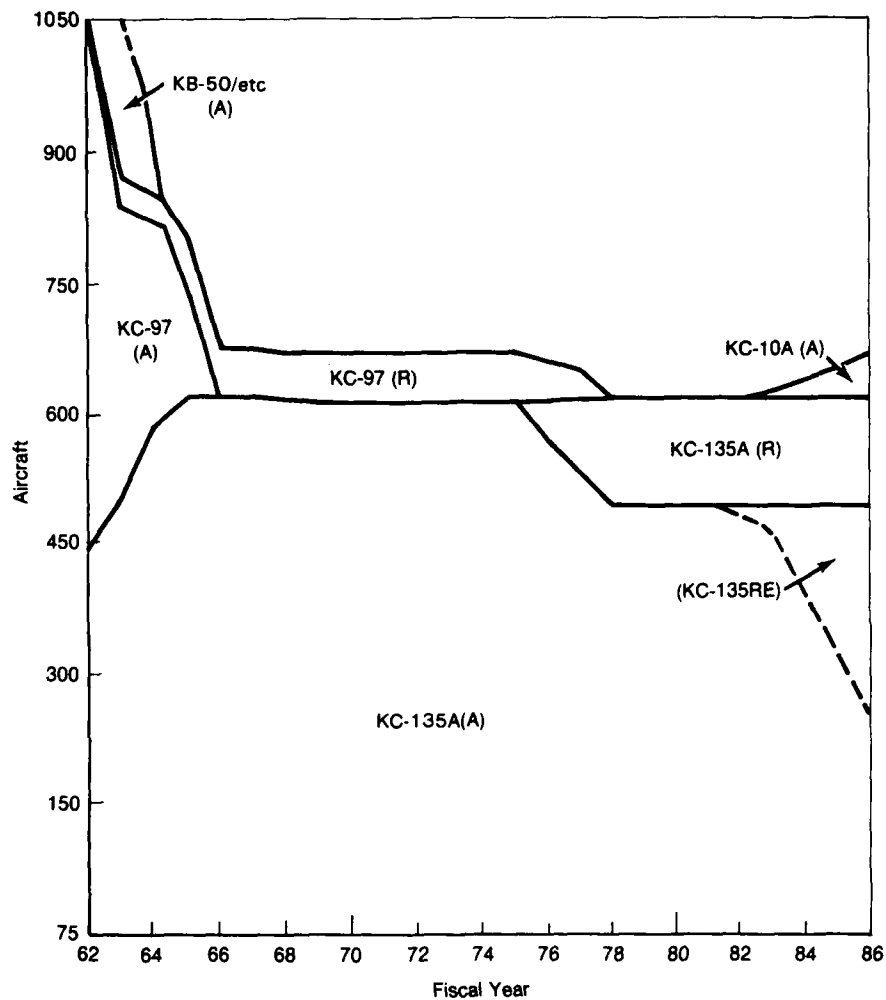


Fig. 48—Long-range aerial refueling force structure

of note to the USAF has been the KC-135A. Force levels over the past quarter century have hovered in the 600-650 range.⁴

⁴The first and obvious purpose of this force was to support SIOP execution by a large and very bomber dependent Strategic Air Command in the early 1960s. The number of bombers in the U.S. force has, to be sure, contracted greatly since the early 1960s, but

Furthermore, the number of aircraft in other U.S. services that might depend on USAF tanker support has tended to grow. It is not feasible either to greatly expand the number of aircraft in the tanker force or, for that matter, to replace what is now in the force on a one for one basis. Barring some unexpected set of developments it is by now obvious that the existing 600 or so KC-135s in USAF represent a resource that will have to be preserved if even a fixed degree of capability is to be assured throughout the foreseeable future. To this end, a re-engining program has greatly augmented capabilities (KC-135RE, here), as has the acquisition of 60 KC-10As.

then so too has the U.S. forward strategic base structure. In addition, more low-level flying time for B-52s, the assignment of tankers to AFRES elements, diminished B-52 range-payload performance on account of outboard missile carriage, etc. have caused SAC's effective strategic air refueling potential to decline as well.

VII. LESSONS AND THEMES EMERGING FROM THIS ANALYSIS

The one hard and fast rule of large-scale budget and posture analysis is that there are no hard and fast determinants of the budget and posture; although our ability to control all developments is constrained, we nonetheless do retain much control over events.

It is possible to identify trends, patterns, and, for want of a better descriptor, *themes* that characterize important developments in our program over time. Though some of the forces determining these themes are arbitrary or are the product of contemporary conditions and developments, many reflect influences with substantial staying power. Therefore, they should be thought of as patterns, which probably exist for good reasons. If they do not continue in force in the future, then we should be able to develop fairly explicit accounts for such deviations. And an explicit understanding of such factors may suggest where we may achieve extra efficiency and effectiveness in our posture in the future.

The most important lesson of all this analysis, of course, cannot be stressed too much:

Nearly all of the factors at work that influence the cost and size of our posture have one thing in common—the cost of acquiring and maintaining a fixed unit of posture (a tactical wing, an alert warhead, a ton-mile of lift capability, etc.) has tended to grow in real terms over time.

The reasons for this are tremendously varied, and the rates at which upward cost growth occur vary greatly too. Certainly one of the most important upward cost stimulators is the increasing cost of technology incorporated into posture over time. As time passes, we call upon our systems to do more, operate in more dangerous surroundings, and do old things better and more efficiently. Thus, while the constituents of our posture increase in capability in absolute (and perhaps relative) terms, so too does their cost. The rate at which cost growth occurs in major systems depends on the type of system, nature of the competition, changing operational environment, etc. Cost per unit of posture has grown at anywhere between 1 and 5 percent (and sometimes more) per year in real terms. For most major weapons, this means that the cost of replacing a posture unit doubles for each new weapon generation.

Other inputs to the total program grow in real terms, too. Personnel tends to become slightly more expensive over time, and the costs of personnel-related entitlements (e.g., dependent health care, retirement) and the like grow more quickly in cost yet. Operational costs, especially energy costs, are known to outpace regular inflation, usually in an irregular way. R&D tends to be more expensive given technological developments. And so on.¹

All of these phenomena combine in ominous ways. More expensive weapons mean that fewer are procured, and this in turn drives up unit costs. It is not just enough to have an advanced platform, we need advanced munitions, sophisticated training, and many other correlates as well. So if we are to maintain a certain end-strength, then all things being equal, we have to pay ever more for it.

Of course, as has been seen, the defense and USAF budgets do not go upward in every year nor do periodic surge-spending years produce the kind of money that would be needed to undo all of the effects of years of budget decline. The consequences of this fact of life are inevitable shrinkages in posture. Obviously, there is a point below which we cannot go, however, in terms of feasible end-strength; for to go below a certain level would necessitate very inefficient support arrangements, an inadequate training base, absurd production diseconomies, inadequate strategic capability, and the like.

Thus, the basic problem before planners—now and for the foreseeable future—is:

Given a basic requirement for posture at some end-strength or other, how do we maintain an effective posture given technological “modernization inflation” and other steady upward movement in the costs of buying and keeping posture?

The answers to this question fall into one of three categories:

1. We can redefine our basic criteria and objectives so that we do not violate our basic strategic requirements.
2. We can seek major changes in the way we buy and maintain posture; this commonly comes under the rubric of “defense reform.”

¹Some improvements can be configured to *reduce* overall costs. Technology can be used to hold down costs in the forms of simulators, automated test equipment, etc. Moreover, pay raises and benefits in line with those of the civil sector lead to a higher quality, higher retention armed force, and thereby yield lower recruiting and training costs. R&D initiatives can enable capital-labor substitution. But the overall trends about the costs of technology influencing major weapons platforms seem to hold regardless of the measures to contain costs implemented so far.

3. We can struggle from year to year to eke out that few percent of savings and increased efficiency to fight the inexorable upward movement in costs (recognizing that progress of this type is likely to be improvised and usually one-time in nature).

The first option involves basic strategic tradeoffs—for instance, diminished emphasis on preparedness for day-to-day contingencies, or an unwillingness to fight sustained conventional wars for very long—and such questions really are not part of our agenda here. The second approach is, to be sure, the most popular and the most frequently encountered option in defense debate. However, advocates of major reform often overlook two points: the ability of attempts at organizational change in themselves to influence underlying processes that exist for good reasons, and the ability of major reform to buck trends on a continuing and systematic basis. Moreover, many reformers overestimate the amount of “savings” that reform could bring.

Given the realities of day-to-day defense management, the third approach to budget management—working on the margin to produce a few extra percentage points of efficiency and effectiveness—is where the payoffs really may be. This assertion is endorsed by many of the data presented in the text.

Under the circumstances, two essential questions for planners in the future would be:

1. What major factors promise to cause major departures from the trends and developments discussed and how might they change the nature of our management at the margin for the better or for the worse?
2. Just how far can marginal improvements actually be taken at a realistic level of effort? Where are the asymptotes on improved payoffs from those modest year to year improvements?

These questions may be illustrated in ways that dramatize the importance of the trend view of the USAF program and budget.

MAJOR POLICY SHIFTS

First, consider major departures from typical ways of doing business. What would be an example of a dramatic initiative to depart from trends that improved our net cost-effectiveness situation? Some cases in point of such programs can be found in the strategic realm.

- The shift from a bomber-oriented posture to one of silo-based solid fueled missiles—later MIRVed missiles—allowed us to keep many more warheads on alert on a routine basis at relatively low cost (bombers could be operated at steadily lower alert rates, with emphasis moving to surge readiness capability).
- The retirement of most of the USAF strategic defense posture saved a substantial amount of money. However, unlike the replacement of routinely alert bombers with routinely alert ICBMs, this reduction in force did involve some adjustment in our strategic concept.

Not all departures from trends represent improvements along some trend line or other. Sometimes the departure from a trend or trend-like process is anything but favorable. Consider a couple of cases.

- During the Reagan strategic revival of the early 1980s, we deviated from our historical pattern of a fairly "efficient" strategic initiative, and followed a pattern much more reminiscent of the USSR. That is, we found ourselves with two ICBMs, two air-launched cruise missiles, two SLBMs, two bombers, etc. in simultaneous development or production. Though perhaps justified as solutions to the window of vulnerability, there is little doubt that we paid for such hedges.
- If the United States resorts to mobile ICBMs (for instance, a small mobile ICBM), it will be flying directly counter to a two-decade trend of holding down the cost per routinely alert surviving warhead that we have accomplished up until now.

INCREMENTAL POLICY SHIFTS

Now consider some marginal activities that have undeniably been very productive from a posture end-strength point of view.

- Keeping aircraft in the force longer, with or without major improvements, contributes crucially to the maintenance of a steady-state USAF posture, at least since the mid-1970s. There are obviously limits on the degrees to which we can follow this approach in some areas (front-line fighter aircraft), but in many cases we can keep our posture at a roughly constant size by extending the service lives of the planes within it (with or without modifications to improve capability).
- The re-engining and other upgrading (as opposed to replacement) of the KC-135 force is proving to be an enormous money

saver: given today's procurement economics, it would be inconceivable to contemplate the purchase of a new tanker force that would have to number in the hundreds. Upgrading existing 1950s and 1960s vintage KC-135s without question is a highly innovative strategy for keeping capability on line into the future without the need for major new investment outlays.

- It is not clear whether such improvements to existing systems as re-engined KC-135s, ALCMs and other upgrades for B-52s, stretching and aerial refueling capabilities for C-141s, and the like are probably best described as marginal, but they certainly do represent major programs to retain and indeed expand force capability at a price tag far below what would be required were we to resort instead to new systems.
- The growing utilization of Air Reserve Forces seems to have paid handsome dividends and does not seem to have been achieved with an excessive diminution in capability.

In contrast, some unfavorable cases of unfortunate incremental trends are:

- Reductions in the quantities of weapons bought is another example. Although spending much more for fighter aircraft during the Reagan administration, we actually bought fewer planes than in the immediately preceding historical epochs. The reason, of course, was that we were emphasizing "high end" aircraft. There is a need for such airplanes, but the core of our posture will always be a less-than-high-end fighter, and probably a multi-role aircraft, such as the F-4 or F-16.
- The growth in military entitlements has proved a steadily growing planning problem (although there is obviously little we can do with this, at least in the short run). Today, entitlements run to more than one-tenth of the entire DoD budget, and this figure will probably continue to rise, particularly as the DoD budget as a whole declines.

The USAF has responded in major and minor ways to pressures on its posture to maintain a substantial degree of capability. Such techniques should be borne in mind in future decisions, to the extent possible, although modifications are often opportunistic (and sometimes are second best options demanded when resources fall below planned levels) and therefore hard to anticipate in a formal planning framework.

Appendix

DEFINITION OF BUDGET TERMS

Total Obligational Authority (TOA) refers to the total value of the DoD program in a given fiscal year, regardless of the origin of the funds. For instance, TOA might include receipts from foreign military sales, which is "income" not authorized by Congress and therefore not appearing in Budget Authority (B/A), the amount of authority granted the DoD by Congress. B/A typically differs from TOA only slightly. The term *outlays* refers to the actual value of the "checks written" in a given FY. It may differ considerably from TOA, particularly during periods of substantial defense buildup and decline, because entire weapons are authorized in a given FY (therefore, the value of such weapons appears in TOA for that FY), but it may take many years to acquire that weapon. As the weapon is built, then, payments (outlays) for it may extend over several years. Thus, when major weapon acquisition is occurring, outlays may lag TOA; in effect, there is a backlog of authority waiting to be converted into outlays. In periods of cutbacks, the reverse can occur. Some funding, particularly salaries and operational expenses, are considered "fast money"—they are generally outlaid in the same year they are authorized; TOA and outlays would therefore be almost the same. The longer lead time weapons explain much of the difference in these accounts.

THE TEN MAJOR FORCE PROGRAMS

1. Strategic Nuclear Forces
2. General Purpose Forces
3. Intelligence and Communications
4. Airlift and Sealift Forces
5. Guard and Reserve Forces
6. Research and Development (not contained elsewhere)
7. Central Supply and Maintenance
8. Training, Medical, and Other Personnel
9. Administration and Associated Activities
10. Support of Other Nations

An eleventh program (Special Operations Forces) has recently been added.

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